

The Tool Engineer

XII

TOOLING FOR SECURITY

PUBLICATION OF THE AMERICAN SOCIETY OF TOOL  ENGINEERS

MARCH, 1952

VOLUME XXVIII, NO. 3

EXPOSITION AND CONVENTION ISSUE

VOLUME VIII

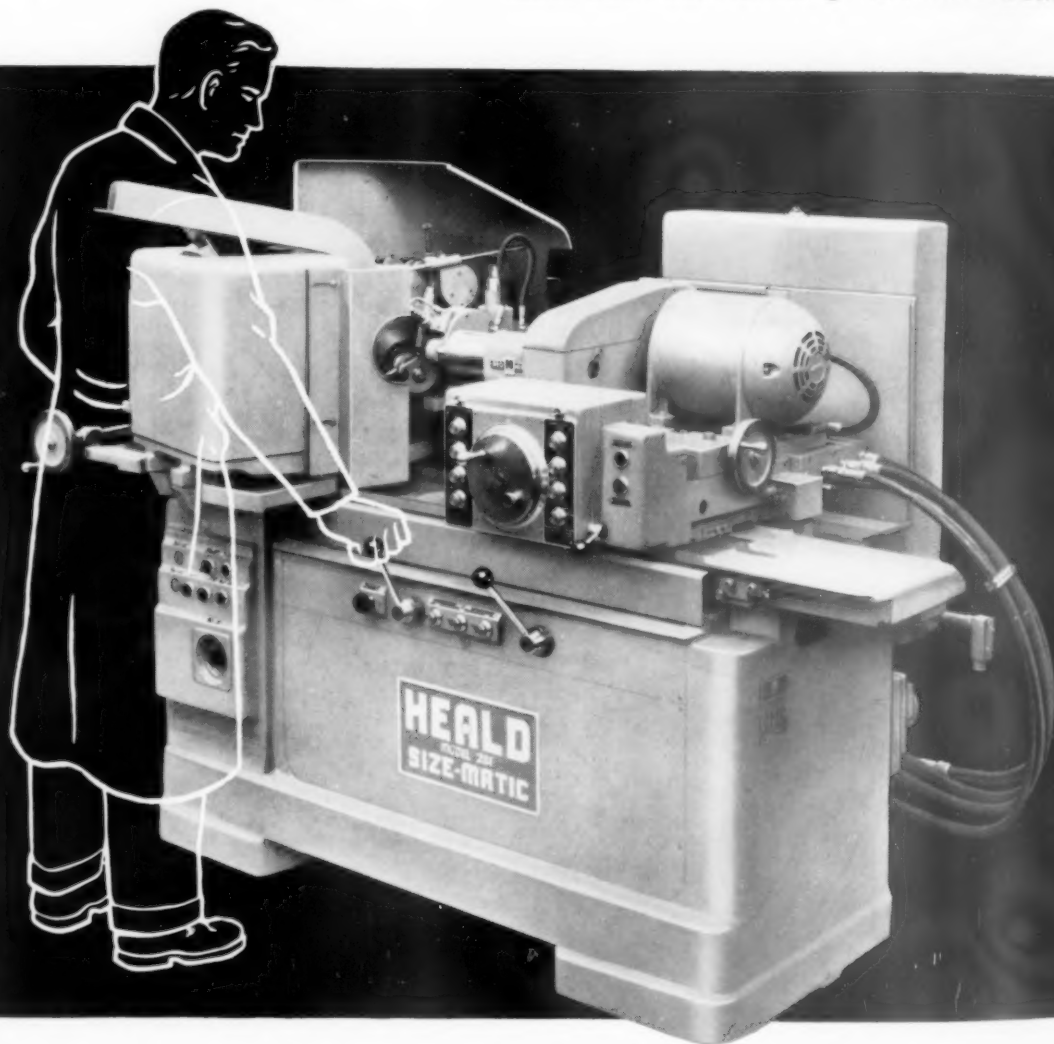


Here's How Heald
helps you get
CLEANER, SAFER,
BETTER
OPERATION

Heald guards and covers
give you 3-way protection

Guarding is an exact science here at Heald. Every machine is equipped with guards and covers that give maximum safety to operators — prevent spattering coolant — keep chips, dust and dirt from interfering with machine operation.

This three-way guarding is particularly important right now. It protects you against loss of production. So make sure that all guards and covers are properly in place when the machine is in operation. This simple precaution can help you get the most out of your precision-built Heald Grinding Machines and Bore-Machin-



*Heald machines speed
the nation's production*

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

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The Tool Engineer

Contents



Proclamation

Part I. 37

Exposition report, program, speakers guide, activities

WHEREAS, The American Society of Tool Engineers, representing some twenty thousand production engineers and executives, is to hold a great industrial exposition in Chicago, March 17 to 21, 1952, and

Part II. 57

Floor plan of the International Amphitheatre, guide to exhibitors' booths, index of exhibited products

WHEREAS, In connection with this exposition, the Society is honoring an extensive series of technical sessions and forums for the consideration of specific vital production problems now confronting American industry, and
WHEREAS, The work of tool engineers and executives is of utmost importance in our national defense programs,
NOW, THEREFORE, I, Adlai E. Stevenson, Governor of the State of Illinois, do hereby proclaim the week of March 17 to 21, of the present year, as TOOLING FOR SECURITY WEEK throughout Illinois, and request the appropriate observance of the period.

Part III. 93

Tool engineering studies, summary of products to be featured at ASTE's Industrial Exposition



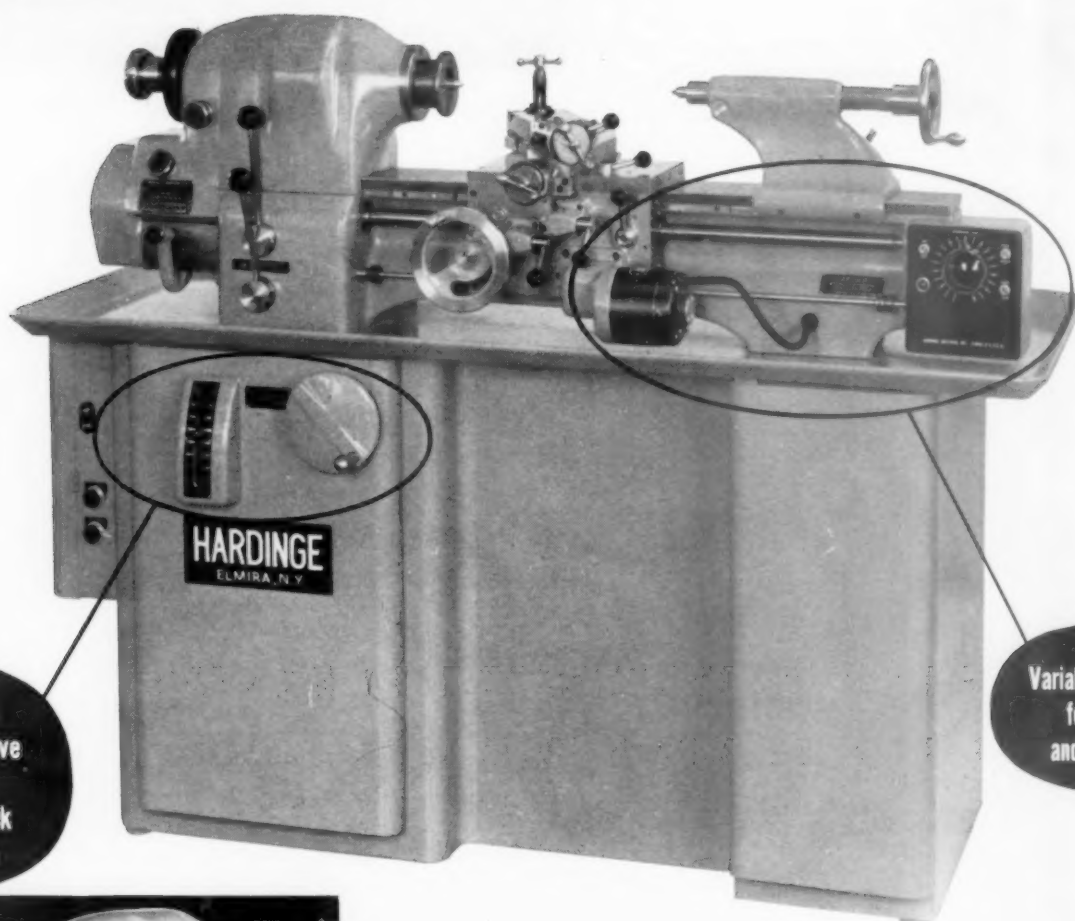
I enclose at the Capitol in the City of Springfield,
this 12th day of March, in the
Year of Our Lord one thousand nine hundred
and Fifty-two, and of the State of
Illinois the one hundred and Thirty-fourth.

by Edmund Izzi and H. J. Zukauskas (see p. 33)

GOVERNOR

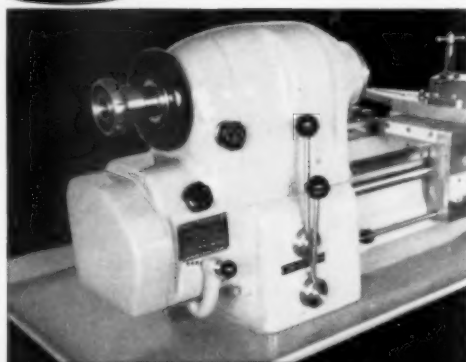
HARDINGE
ELMIRA, N.Y.

TOOL ROOM and PRODUCTION LATHE

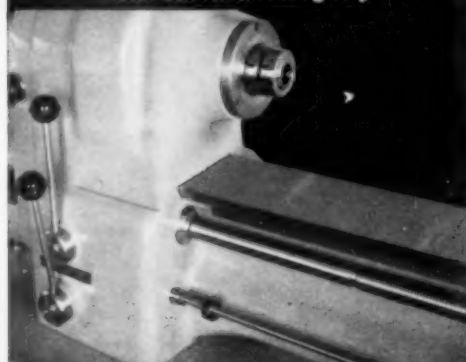


Variable
Speed Drive
for
Headstock
Spindle

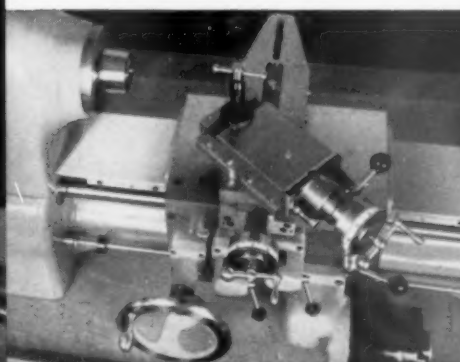
Variable Feed
for Carriage
and Cross Slide



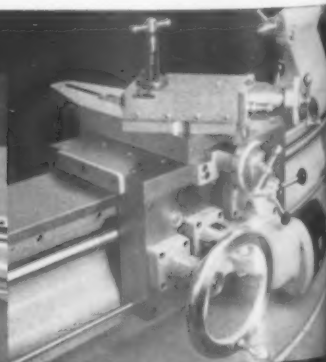
Gear Box for Threading Only



Solid Hardened and Ground Steel Dovetail Bed Ways



Solid Full Bearing on Top of Bed



Solid Full Bearing on Front of Bed

A.S.T.E. SPACE 1516

See this modern Hardinge Model HLV with infinite control of speed and feed demonstrated under actual in-use plant conditions.

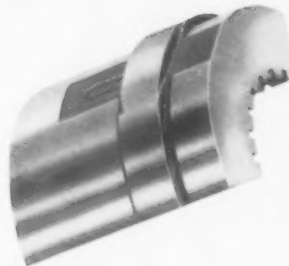
HARDINGE
ELMIRA, N.Y.

TOOLING For PRODUCTION

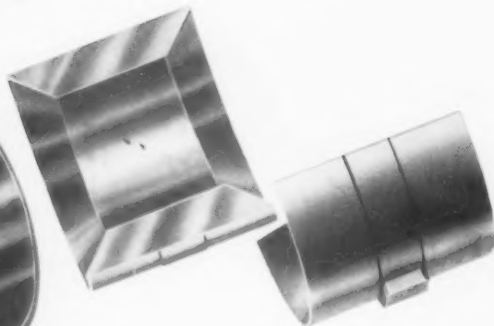
STANDARD EQUIPMENT in Progressive Screw Machine Plants



Style "S"
Master Collets
and Pads

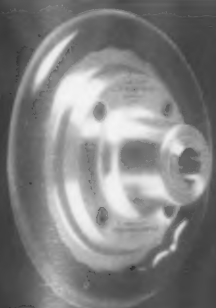


Style "B"
Master Feed Fingers
and Pads

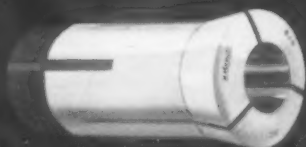


A.S.T.E. SPACE 1516

See the **only** Master Collet with no work pressure on the screw. Pads are interchangeable among different makes of automatics. Also included will be the complete line of Hardinge Collets and Feed Fingers for all makes of Automatics, Chucking Machines and Turret Lathes.



HARDING-SJOGREN
Speed COLLET CHUCK



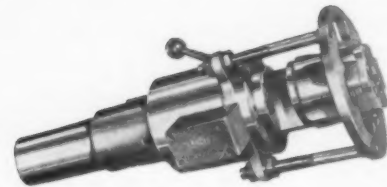
HARDINGE DRAW-IN COLLETS
FOR ALL LATHES AND MILLERS



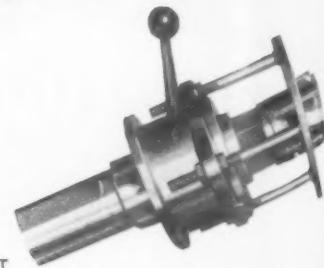
HARDINGE COLLET
INDEX FIXTURES

LANDIS Threading Tools

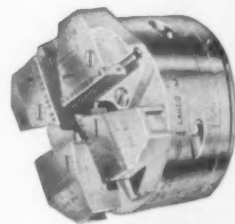
A. S. T. E. Show
Booth 1918



STYLE LL
RECEDING
COLLAPSIBLE TAP



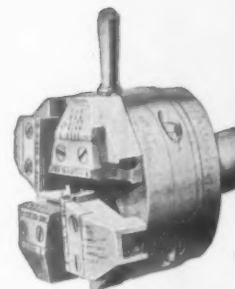
STYLE ALT
COLLAPSIBLE TAP



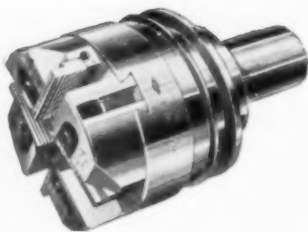
LANCO TYPE R
DIE HEAD



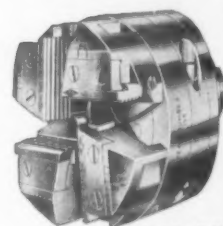
LANDMATIC TYPE H
DIE HEAD



LANDMATIC TYPE J
DIE HEAD



LANDEX TYPE LL
DIE HEAD



LANDEX TYPE VV
DIE HEAD



LANCO TYPE VV
DIE HEAD

• TAPS

The ALT Collapsible Tap for producing parallel threads. The LL Receding Chaser Collapsible Tap for tapered threads. Both have a wide diametrical range through use of detachable heads. Either can be used as Rotary or Stationary. Special Taps are available.

• DIE HEADS

The Lanco for Threading Machines, Landmatic for Turret Lathes, and the Landex for automatics. The Heat Treated R, F, and J types for economy, wide range coverage, quick set-up changes, and oversize capacity. The Hardened and Ground VV, H, and LL types for work on which extreme accuracy and maximum production are of prime importance.

• CHASERS

All Landis Die Heads use Landis Tangential Chasers featuring: interchangeability, natural cutting clearance, permanent throat, useable for 80% of their length, right- and left-hand thread with same chasers, and changeable rake and lead angles.



THE LANDIS
TANGENTIAL
CHASER

LANDIS
Machine
COMPANY
WAYNESBORO • PENNA.



STANDARD

Gages

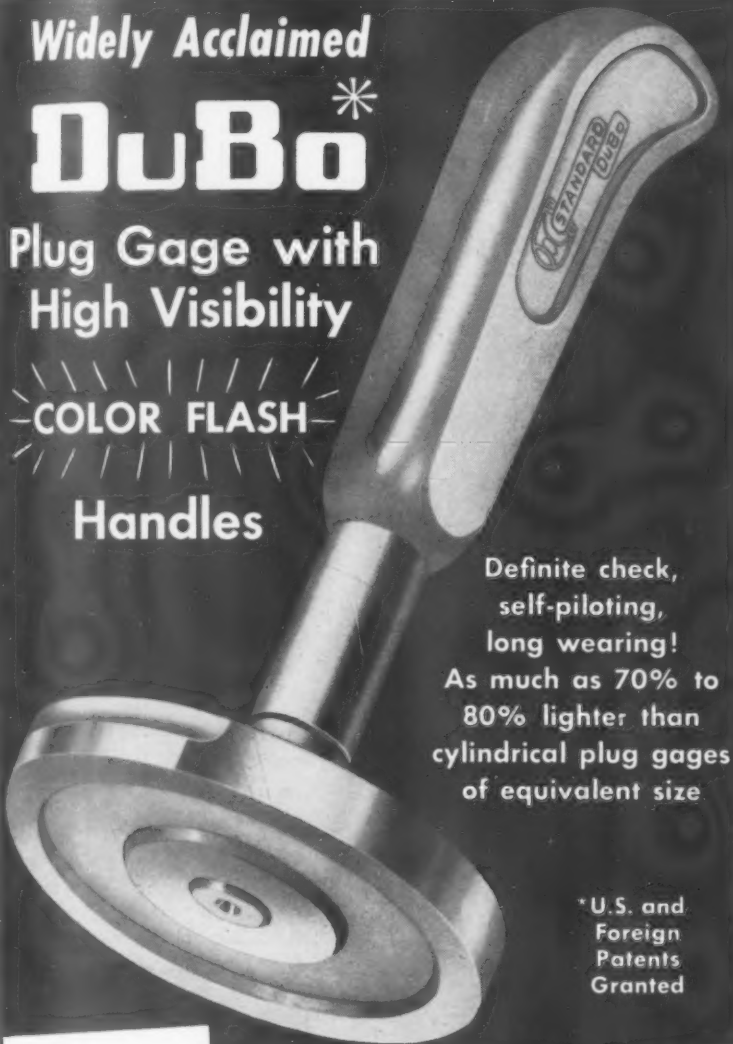
Widely Acclaimed

DuBo*

Plug Gage with
High Visibility

COLOR FLASH

Handles



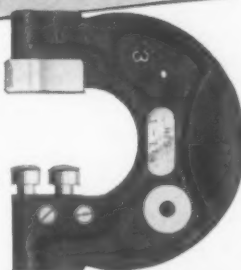
Definite check,
self-piloting,
long wearing!
As much as 70% to
80% lighter than
cylindrical plug gages
of equivalent size

*U.S. and
Foreign
Patents
Granted

Be Sure
to Visit
BOOTH 532
at
**ASTE
SHOW**

Adjustable Limit Snap Gages

Regular and Midget
Models and the
ultra-efficient
SUPER SNAP GAGE
with
"spherical" pins



A few of many models
to make your gaging
job better . . . easier.

DIAL INDICATORS

Sizes and Models
for all
applications

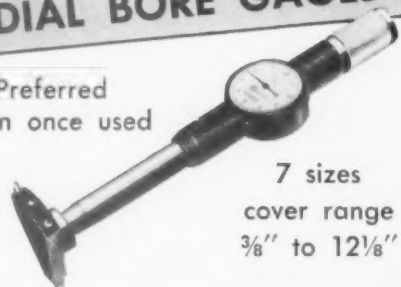
Shockproof Mechanism
standard on most models



DIAL BORE GAGES

Preferred
when once used

7 sizes
cover range
 $\frac{3}{8}$ " to $12\frac{1}{8}$ "



DIALIZERS

PATENTED

Quickly, easily,
economically
convert AGD
Adjustable Limit
Snap Gages
to Dial Type



Write for Condensed Catalog B

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



TOPS IN *Tap Performance*

WINTER Hand Taps, like all other taps in the complete WINTER line, have inbuilt *Balanced Action*, for better size control and longer tool life.

WINTER BROTHERS COMPANY, Rochester, Mich., U.S.A.
Distributors in principal cities. Branches in New York, Detroit, Chicago, San Francisco. Division of National Twist Drill & Tool Co.

ALWAYS AT
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Your local Industrial Supply Distributor carries WINTER Taps in stock, for both General Purpose and Special applications.

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NATIONAL

Reamers

NATIONAL Reamers mean better performance, smoother finish, longer life.

**NATIONAL TWIST DRILL
AND TOOL COMPANY**
Rochester, Michigan, U. S. A.

Distributors in principal cities. Factory
Branches: New York, Chicago, Cleveland,
Detroit, San Francisco.

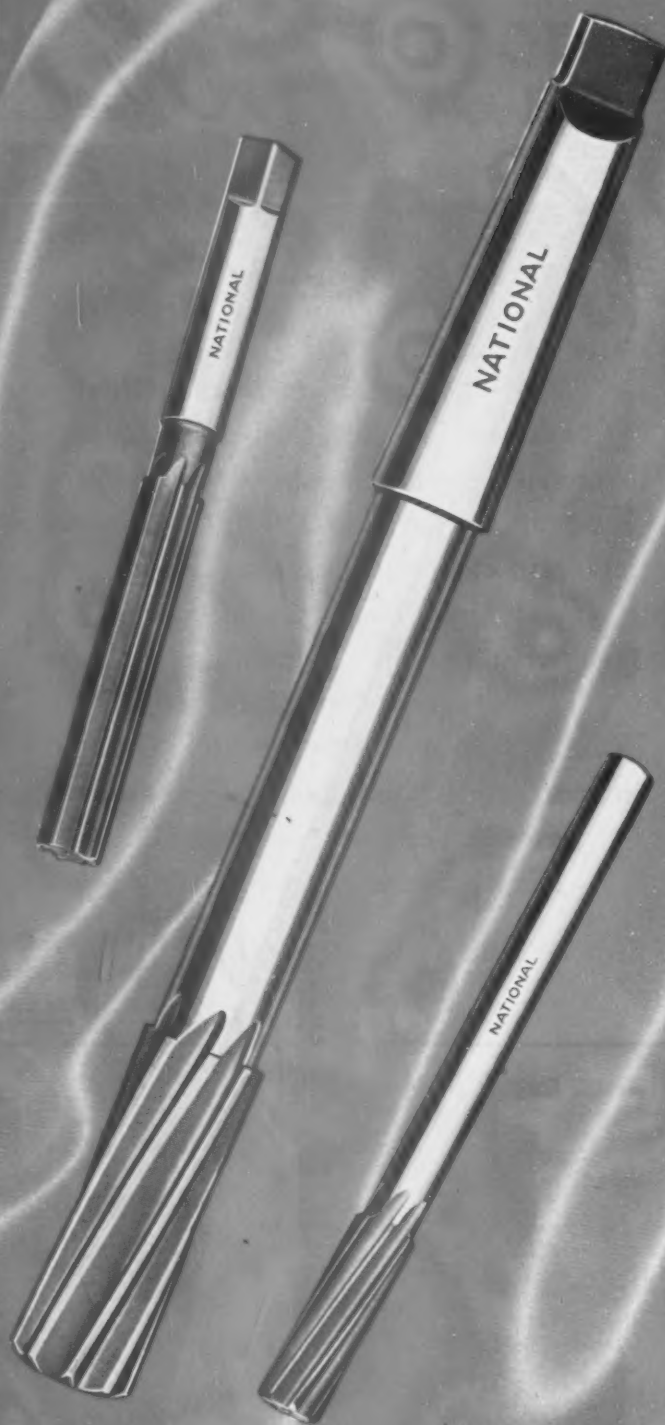


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INDUSTRIAL SUPPLY
DISTRIBUTOR**

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including NATIONAL twist drills, reamers,
counterbores, milling cutters, end mills,
hobs, and special tools.



National



BOYAR-SCHULTZ

Tool Room Grinders

● Wherever Boyar-Schultz Grinders have been installed, their design, quality of materials and unexcelled workmanship are quickly recognized. ¶ In shops where accurate, close tolerance work is necessary, skilled mechanics turn instinctively to Boyar-Schultz Grinders, knowing that these tools give fullest expression to their ability. ¶ With Boyar-Schultz Grinders in your shop or tool room, you are sure you have the best your tool dollar can buy.

Write for circulars.



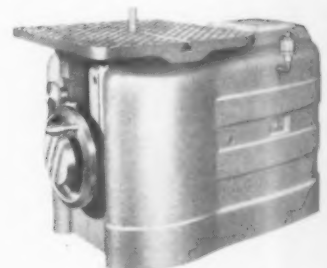
No. 6-12 SURFACE GRINDER
LARGE Machine Performance
Small Machine Cost!



No. 2
PROFILE GRINDER
With Dual or
Single Spindles



No. 6-18
SURFACE GRINDER



No. 1
PROFILE GRINDER

BOYAR-SCHULTZ CORPORATION

2105 WALNUT STREET
CHICAGO 12, ILLINOIS

NIAGARA

**BOOTH
No. 1313**



at

1952 INDUSTRIAL EXPOSITION

INTERNATIONAL AMPHITHEATRE
CHICAGO - March 17-21 Incl.



See what's new in 1952! Ask for a demonstration of Niagara's Modern Machines of Latest Design specially engineered for the sheet metal industries. Learn how Niagara machines will fit into your shop, save time, cut costs and produce quality work.

- Air Actuated Squaring Shears
- Electrically Driven Squaring Shears
- Foot Operated Squaring Shears
- Air Actuated Bar Folder
- Multi-drive Power Table for rotary operations
- High Speed Circle Shear
- Universal Rotary Machine rigged for flanging
- Electrically Driven Slip Roll Former
- Hand Tools

ASK FOR LATEST NIAGARA BULLETINS AT THE SHOW OR BY MAIL

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.
America's Most Complete Line Presses, Shears, Machines and Tools for Sheet Metal Work
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What are the new developments in Tool Grinding ?

...you'll know when you visit the exhibit

by **CARBO**
TRADE

"Carborundum" is a registered trademark of
The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM

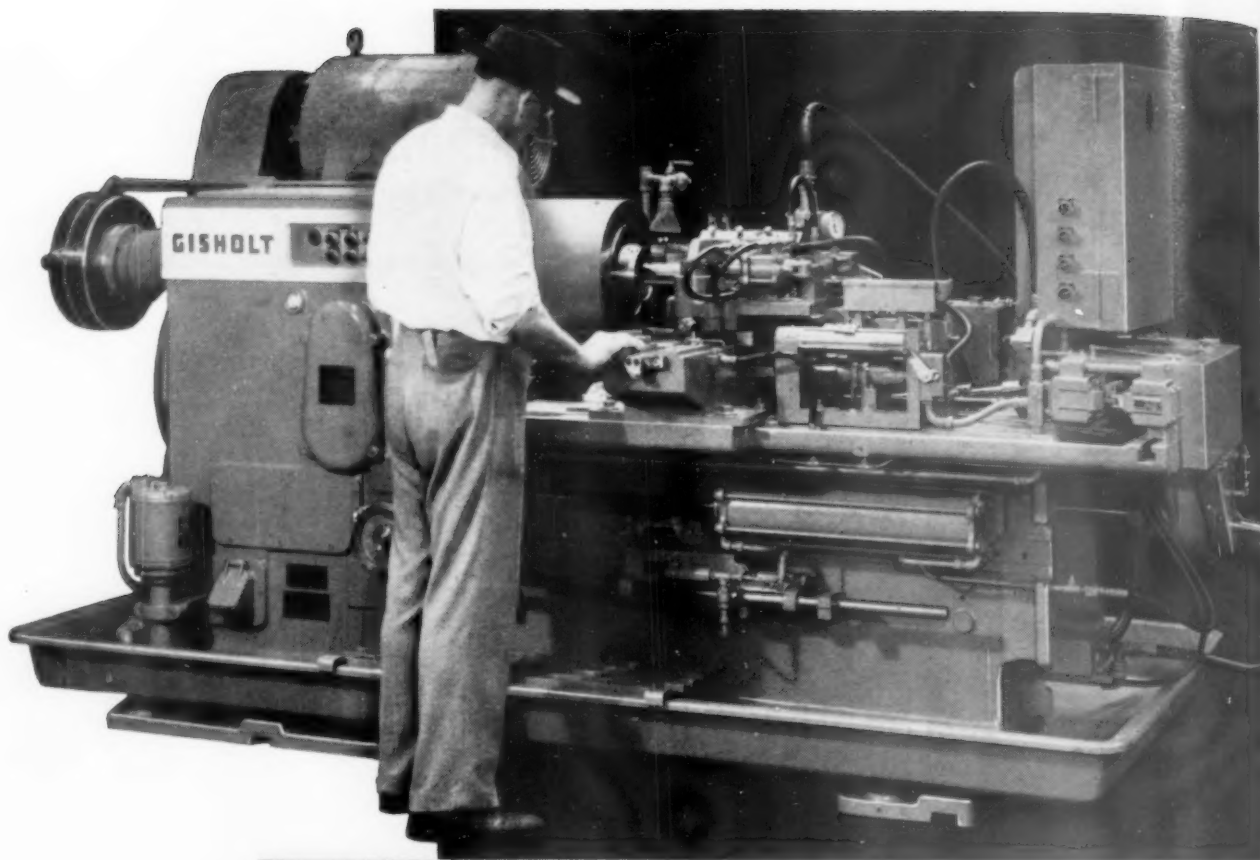
DE MARK

at the **ASTE**
TOOL SHOW

CHICAGO • MARCH 17 thru 21

Booths 1326 and 1330

-
- If you have to miss the show . . . get the news of the latest from your **CARBORUNDUM** Salesman or Distributor



HOW **8** SIMPLIMATICS

cut machine time 50%
cut man-hours 75%

The way you can slash costs with the Gisholt Simplimatic often surprises some of the most experienced production men.

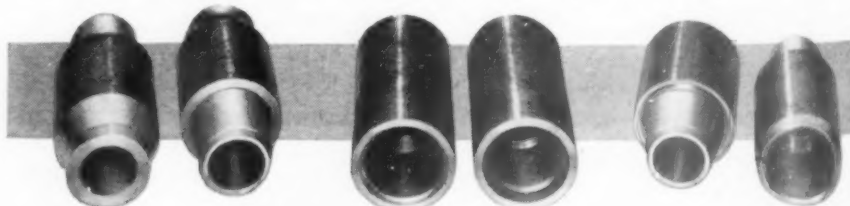
Here's a big shop which found that 8 Simplimatics could take over the job done on 16 other machines. And it takes only 4 operators instead of 16 to turn out the volume of parts required.

Not the least in the cost picture is the machine itself. For the basic Simplimatic

design permits you to individualize the machine to a high degree to solve many different problems. Thus, for many jobs you can have all the advantages of a special machine merely with special tooling. Yet it's all done on a Standard Simplimatic—at far lower cost.

The importance of lower costs these days makes it important for you to get all the facts about Simplimatic Automatic Lathes.

The GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.



In producing these tool joint pins and boxes, the 8 Simplimatics work in pairs with fully automatic operation; one man can easily tend two machines.

Ask about the many different arrangements possible on the Standard Simplimatics with plate table, vertical head, etc.

GISHOLT MACHINE COMPANY, Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • BALANCERS • SUPERFINISHERS • SPECIAL MACHINES

BUY THE TOOLS YOUR MEN KNOW AND TRUST...

Starrett

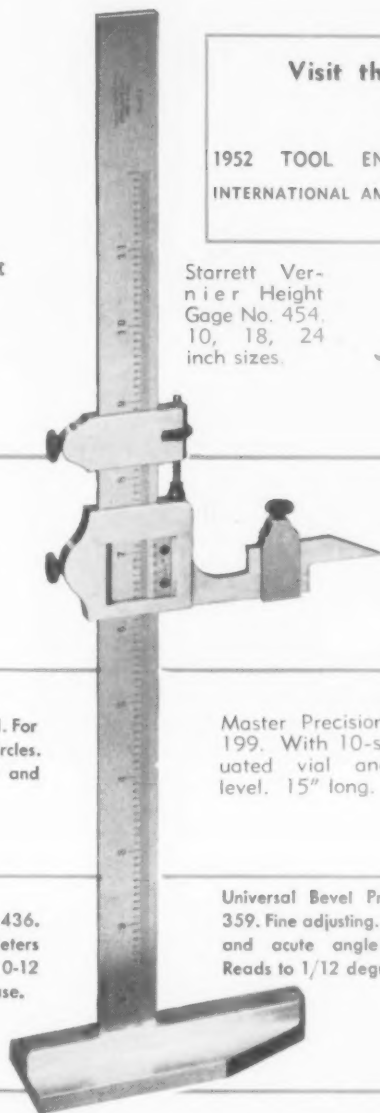
SHOP EQUIPMENT PRECISION TOOLS



When you buy precision tools for the shop, buy the same kind your men buy for themselves — STARRETT TOOLS. For over 70 years, skilled craftsmen have preferred and used Starrett Tools. They are accustomed to Starrett accuracy, Starrett convenience and Starrett superior design features. They do better work and more of it with tools they know and trust.

Visit the STARRETT EXHIBIT BOOTH 833

1952 TOOL ENGINEERS INDUSTRIAL EXPOSITION
INTERNATIONAL AMPHITHEATRE • CHICAGO • MARCH 17-21



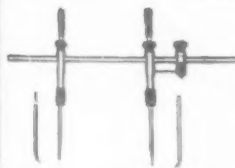
Starrett Vernier Height Gage No. 454. 10, 18, 24 inch sizes.



Starrett Gear Tooth Vernier Caliper No. 456. Two sizes: 20-2 and 10-1 diametral pitch. Also in Metric.



Starrett Vernier Caliper No. 122. 6, 12, 24, 36 and 48 inch sizes.



Steel Beam Trammel No. 251. For 18, 26, 36 and 72" dia. circles. With needle, ball, pencil and caliper legs.

Master Precision Level No. 199. With 10-second graduated vial and auxiliary level. 15" long.



Micrometer Caliper Sets No. 436. Sets of six or twelve micrometers covering the range 6-12 or 0-12 inches. In Finished Wood Case.

Universal Bevel Protractor No. 359. Fine adjusting. With Vernier and acute angle attachment. Reads to 1/12 degree.



TRADE MARK
Starrett
REG. U.S. PAT. OFF.

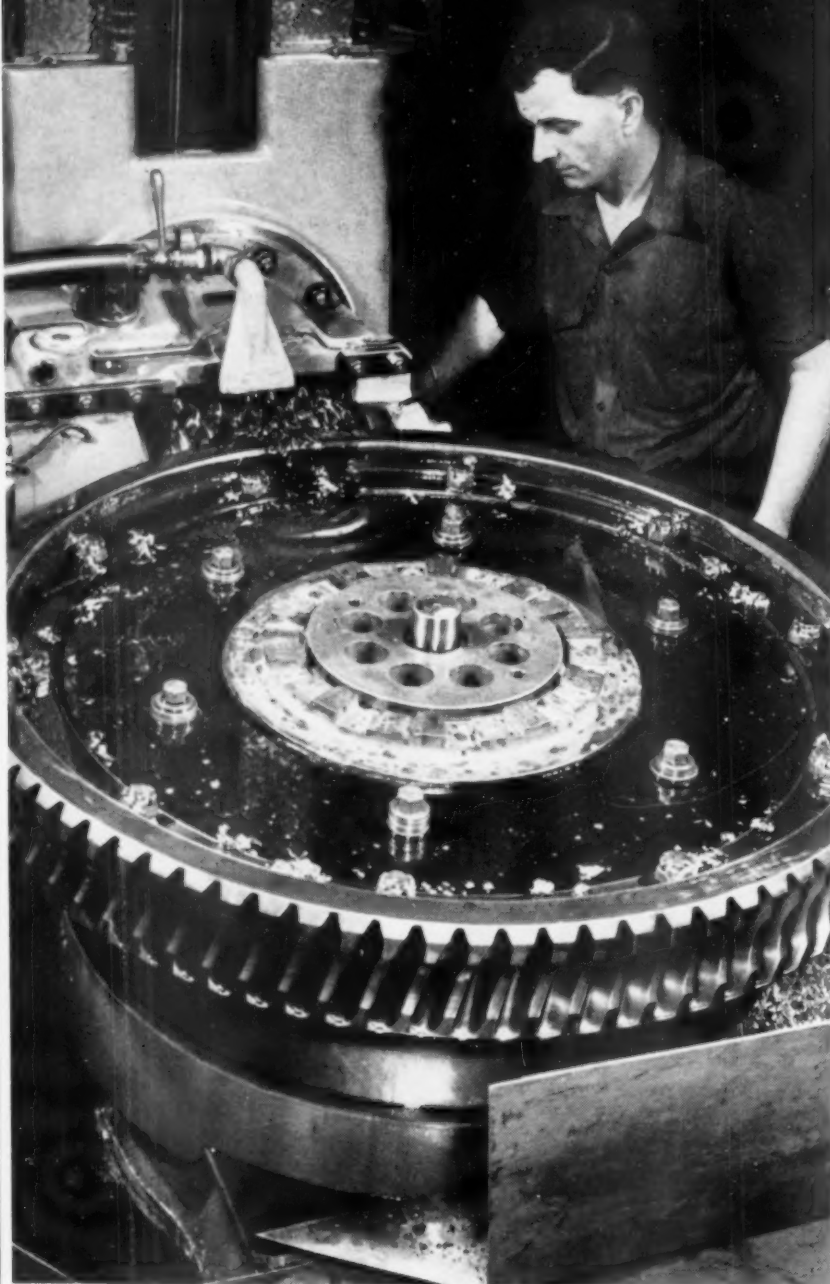
SINCE 1880
WORLD'S GREATEST TOOLMAKERS



THE L.S. STARRETT COMPANY • ATHOL, MASS., U.S.A.

BUY THROUGH YOUR DISTRIBUTOR

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS, BAND SAWS and BAND KNIVES



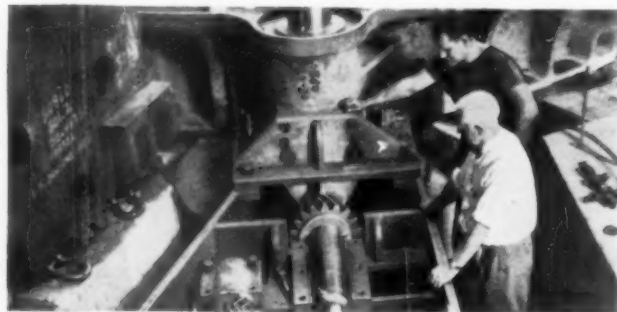
Cutting a large gear • Metal: bronze, 130 Brinnell • Machine: Gould & Eberhardt gear hobbing machine • Part: main drive worm gear wheel for large shear • 42 $\frac{5}{8}$ " O.D.; 5" thick; 37 teeth • Tool: high-speed steel hob • Feed: 0.006 • Speed: 42 rpm • Cutting Oil: Sunicut 105

THESE "JOB PROVED" SUN PRODUCTS STEP UP PRODUCTION, HELP CUT COSTS

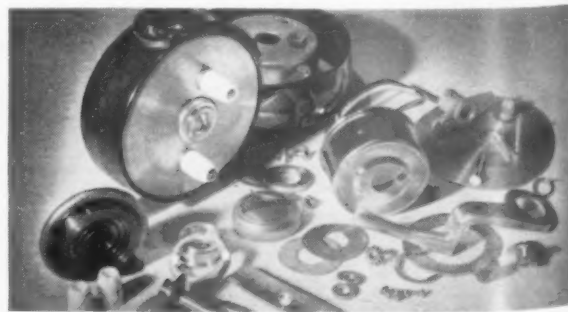
When a Sun representative recommends a lubricant or cutting oil, he does so with confidence. Every product developed in Sun's laboratories is exhaustively tested by actual use in industry until desired performance characteristics have been clearly established. Only then is it rated "Job Proved" and offered for sale.

In tackling your problems, a Sun representative draws on the wealth of experience he has acquired working in all fields of industry. If the technical nature of your problem calls for it, one of a special group of Sun mechanical and chemical engineers will go to work in your behalf. Back of them, remember, are the vast research, development and refining facilities of Sun Oil Company. All this is your assurance that Sun products step up production, help cut costs.

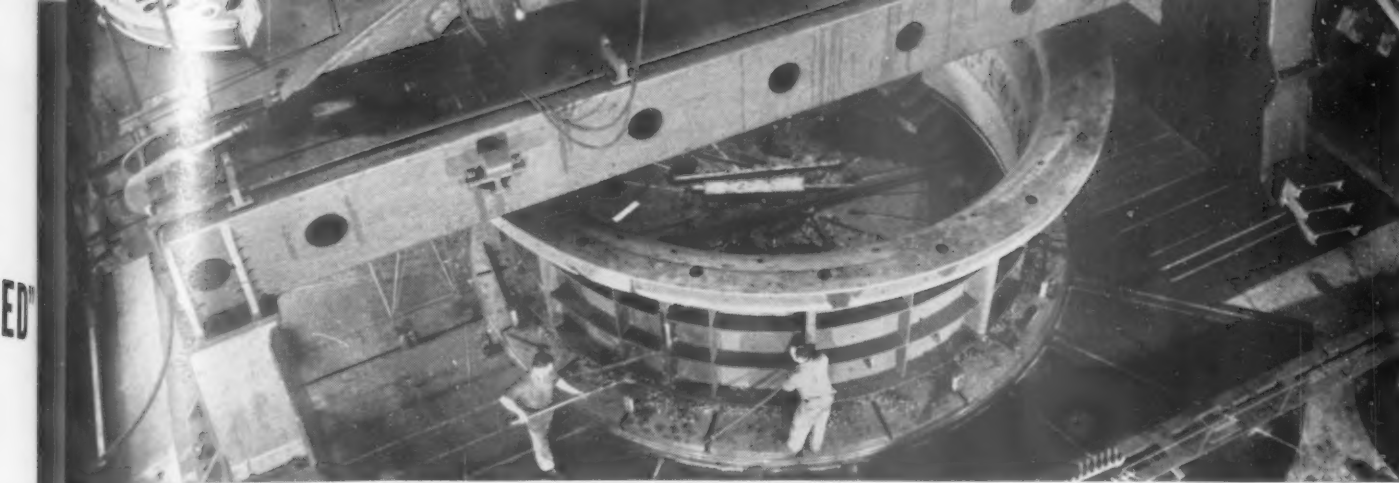
For complete information on Sun cutting oils and lubricants, or the services of a Sun representative, call or write the nearest Sun Office.



This synchronous gear drive is part of one of the world's largest vertical boring mills. It controls table speeds from .094 to 6,045 rpm and is pressure-fed with Sunep—an extreme pressure lubricant that is exceptionally stable. Its high film strength minimizes wear and protects heavily loaded teeth in many types of gear boxes.



This reel contains free-cutting brass, aluminum, cold-rolled and stainless steel, phosphor, and hardware bronze. All except the stainless steel were machined on B&S Automatics using Sunicut 11, which does not corrode the bronze gibs, minimizes carry-off. Another Sunicut grade is used on the stainless steel.



\$400,000 vertical boring mill, one of the world's largest, bores, turns and faces hydraulic turbine parts. Sunoco Way Lubricant, approved by 38 machine tool builders, was selected by

the design engineers to prevent stick-slip with resultant scoring of ways and slides. Even under the weight of work as heavy as 75 tons, Sunoco Way Lubricant has never squeezed out.

METALWORKING LUBRICANTS

SUNVIS 900 OILS—Unexcelled for hydraulic systems, spindles, and gear boxes of machine tools where longest possible oil life, plus maximum protection, is required. Sunvis 900 Oils have a high viscosity index and uniform 0 F pour point, are fortified to prevent corrosion and oxidation.

SUNVIS OILS—For general lubrication of machine tools at normal temperatures. Ideal for application through oil cups, fittings and holes. Have high uniform viscosity index, low pour point, and low carbon content.

SUNVIS H.D. 700 OILS—Unsurpassed for hydraulic systems and gear boxes where continuous contamination and rusting are problems. Recommended as hydraulic system cleaners. Supply detergency, and minimize oxidation and corrosion.

CIRCO OILS—Straight mineral oils designed for once-through application by bottle-oilers, wick-feed oilers, oil holes, etc., on machine tools.

SUNTAC OILS—Recommended for bearings, gears, sprockets, chains, couplings and linkages to eliminate "throw-off." Compounded to provide adhesiveness. Suntac Oils cling to bearing surfaces and supply constant, superior lubrication.

SUNOCO WAY LUBRICANT—Eliminates "stick-slip" of tables, scoring of machine tool ways, poor finishes. Non-corrosive, with outstanding metal-wetting and adhesive properties, ample viscosity, and E.P. qualities.

SUN GUN GREASES—Smooth greases with excellent pumpability. Designed for pressure fittings on equipment operating at normal speeds and temperatures.

SUN ADHESIVE PRESSURE GREASES—For chains, slides, cams, sprockets, open gears, cables, couplings, linkages, etc., where "throw-off" must be avoided. Applied without preheating.

SUN ROLLER BEARING GREASES—For use in electric motors and ball or roller bearings on machine tools.

SUNEP OIL—Lead-naphthenate type of extreme-pressure lubricant for heavy-duty gears, bearings and other heavy-duty applications. Excellent stability, as well as rust-preventive and noncorrosive characteristics, helps prolong life of gear sets.

CUTTING OILS

SUNOCO EMULSIFYING CUTTING OIL—Mixes with water to produce a stable white emulsion. Efficient and economical cooling and lubricating medium for turning, milling, drilling and other metalworking operations on ferrous and nonferrous metals. Also an excellent grinding coolant.

SUN HEAVY-DUTY EMULSIFYING CUTTING OIL "F"—Developed for applications where neither regular emulsifying oils nor straight cutting oils are completely satisfactory. Can frequently replace straight oils, especially on high-speed jobs, where it eliminates smoking.

SUNICUT 11—A low-viscosity, transparent, straight cutting oil that will not stain brass or copper under normal conditions. An excellent dual-purpose oil, it is intended mainly for Brown & Sharpe automatics machining all nonferrous metals, as well as free-machining steels such as B1112 and B1113.

SUNICUT 102—A transparent, active-sulfur-type, straight cutting oil recommended for automatic screw machines on all types of steel. An ideal general-purpose cutting oil in shops using a wide variety of machines.

SUNICUT 105—Heavy-duty, transparent, sulfurized, straight cutting oil for operations like gear-cutting and broaching. Also for turret lathes and hand screw machines doing turning, threading and tapping on alloy steels.

SUNICUT 209—A medium-viscosity, transparent, straight cutting oil for machining all

grades of steel, also brass and copper. Especially good as a dual-purpose oil on larger automatics. Recommended for more difficult screw machine jobs—such as alloy steels and tough bronzes demanding high finishes and close tolerances.

SUNICUT 216—A special oil developed for thread-grinding operations. Heavily compounded to produce mirror-like finishes and eliminate burning and checking.

SUNICUT 812W—Low-viscosity, transparent, straight oil, containing additives which prolong tool life, produce a better finish. For use as a dual-purpose oil for automatic screw machines and as a general-purpose, medium-duty cutting oil for nearly all machine tools.

SUNICUT 817W—Similar to Sunicut 812W except that it has a higher viscosity. Retains its excellent cutting and lubricating qualities even under the severe conditions for which it is intended... heavier cuts and higher temperatures.

SUNICUT 973—Low-viscosity, transparent, straight cutting oil gives superior finishes and excellent tool life when machining aluminum or magnesium and their alloys. Won't stain steel, aluminum, magnesium or copper. Its cooling and lubricating qualities make high-speed production possible.

ADDITIONAL METALWORKING PRODUCTS

SUN QUENCHING OILS—Oils specially refined to aid maximum development of desired physical properties in a wide variety of steels.

SUN TEMPERING OILS—Particularly suited to tempering steel. Because of their low carbon content and long stability under heat, these oils have an unusually long service life.

SUN ROLLING OILS—Both straight and emulsifying oils which permit maximum production in rolling steel, aluminum, brass and copper.

SUN SPIRITS—For metal cleaning. Among fastest cleaners of its type. Colorless and free of sulfur compounds. Needs no heating or mixing. Considered safe when used properly for factory processes by the National Board of Fire Underwriters. Flash point over 100 F.



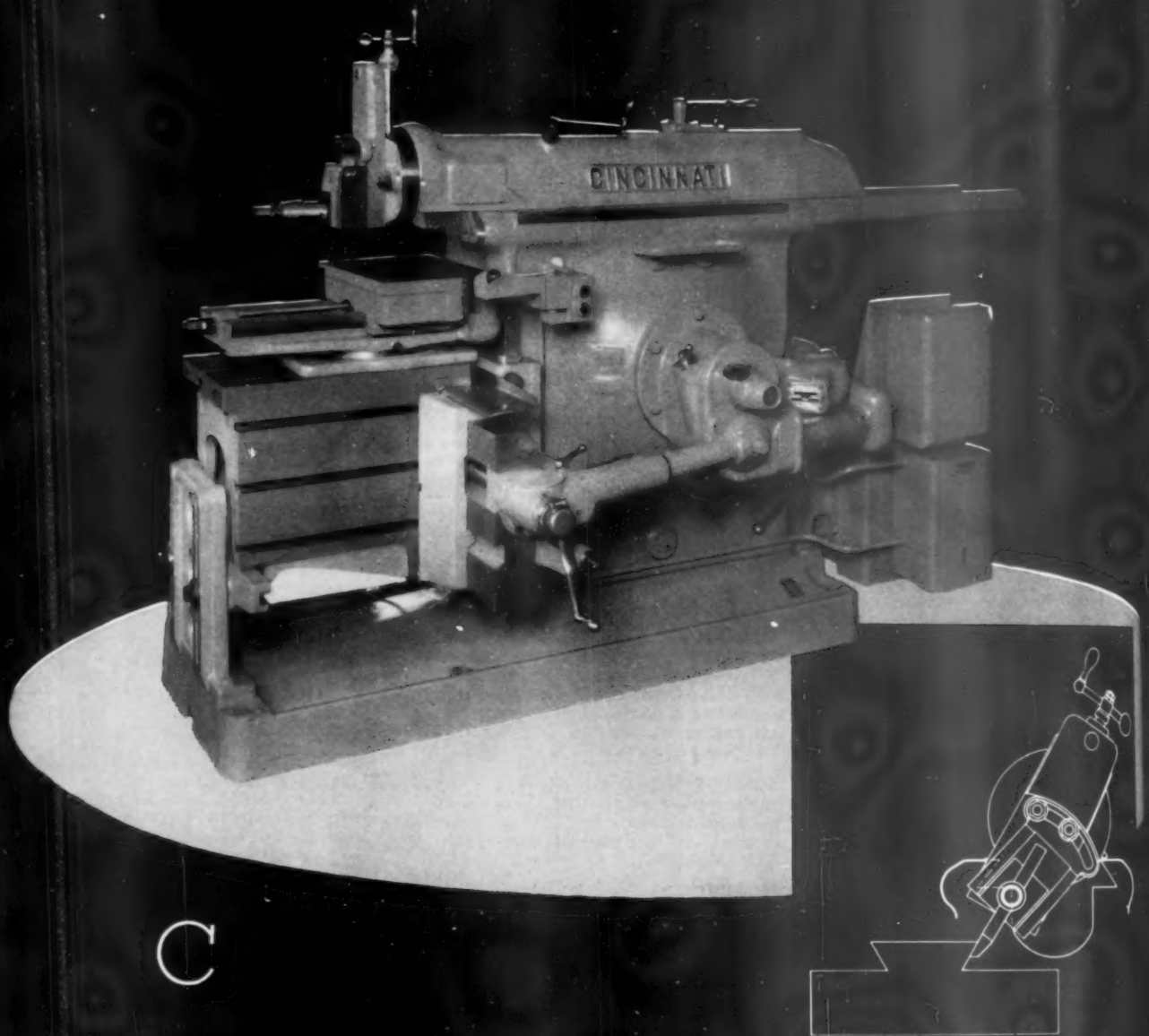
In this pipe fitting plant, S.E.C.O. replaced a straight cutting oil and eliminated the need for costly alkali cleaners and rust preventives. Beside doing an efficient cutting job, it keeps fittings from rusting or discoloring, and has eliminated slippery floors.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



Outstanding Accuracy



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



DoALL



GAGE BLOCKS



SURFACE GRINDERS

PRODUCTION NEWS

SAW BANDS • GAGING EQUIPMENT • TOOL STEEL • CUTTING TOOLS • INDUSTRIAL SUPPLIES

L 1

Published by The DoALL Company, 254 N. Laurel Ave., Des Plaines, Illinois

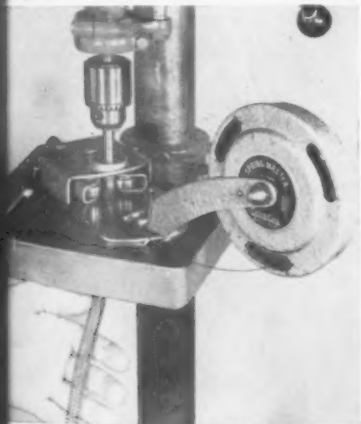
No. 2

ALL CONTOUR-MATIC SPEEDS MACHINING OF AIRCRAFT FORGINGS, ELIMINATES NEED FOR \$40,000 OF ADDITIONAL MACHINE TOOLS

Spring-Master Attachment Turns Drill Press Into Low Cost "Spring Factory"

Less Than 7 Minutes Required to Set Up for Making Compression or Tension Springs

A new, high speed, low cost spring-making device for attachment to drill presses is now available. In less than ten minutes the easy-to-operate Spring-Master can be mounted on a drill press and put to work winding



Spring-Master mounted on drill press.

ings from wire diameters of .021 through .071. Spring-Master helps avoid assembly delays because it can be used in making production springs. It saves time and money by making development springs for trials or product improvement. It reduces down-time on production machines because it can be used for making replacement springs. The Spring-Master is a high speed unit which has produced as much as 100 feet per hour of closely wound coils of .040 wire. The operation can be mastered by unskilled labor and one person can often handle two units at a time.

This new machine can be attached to any drill press. A special looping tool for making either full or double loops is included.

For a demonstration—or literature—write DoALL.

Band Machine Rough Cuts Parts To Shape Eliminates Annealing, Rough Milling

Faced with the problem of stepping-up machining production on vital aircraft forgings, the A. W. Hecker Co., Cleveland, Ohio either had to invest \$40,000 to \$50,000 for additional milling machines, or look for a better, faster way to do the job. The solution, and only about 1/10 as costly, was using a DoALL MP-20 Contour-matic band machine.

These 4140 aircraft forgings were formerly torch cut, annealed, rough milled and finished milled. Now the parts are drilled, sawed to shape on the Contour-matic and then finished milled. The additional output required has been created entirely by the Contour-matic. The existing milling machines are easily capable of handling the finishing work now that the major part of the stock removal is handled by band sawing.

The Contour-matic is particularly advantageous on production work because all movements are hydraulic and automatic, making possible faster, more accurate work with less operator fatigue. Speed range of the machines is 40 to 10,000 blade feet per minute.

The DoALL Contour-matic cuts any material to any desired shape. It not only saves time and money, but also valuable metal. DoALL band machining slices the material apart instead of reducing it to a pile of chips. The metal saved can often be used for making other parts, tools or dies. The Contour-matic uses precision DoALL band tools that handle any sawing, filing, grinding or polishing job on all ferrous, non-ferrous and all non-metallic materials.

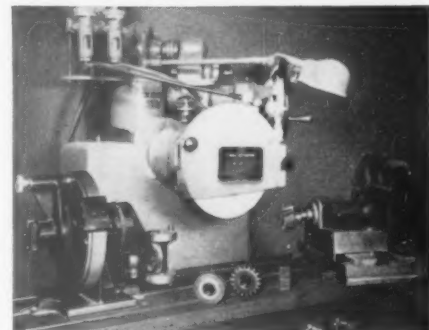


Close-up of sawing fixture developed by customer for production cutting of aircraft forgings.

Your DoALL Sales-Service Store will conduct a free demonstration of DoALL band machines in any plant. Literature is also available.

New Gear Generating Attachment For Surface Grinder To Be Featured at ASTE Show

Visitors to the DoALL Booth at the ASTE show March 17 to 21 in Chicago will see for the first time how gears can be quickly and easily made on a DoALL Surface Grinder with the aid of a new gear generating attachment. This new unit requires only one simple set-up to produce gears up to 6" in diameter with any pressure angle desired, and any number of teeth up to 100. Gears can be made from either solid or pre-cut blanks and the only accessories needed are gage blocks and sine bar. Masters, base cylinders, racks, etc., are not required with this attachment. The exhibit will also include demonstrations of band machines, gages, cutting tools and specialties.



"DoALL Surface Grinder Saves Terrific Amount of Grinding Time," Says Tool Room Foreman . . .

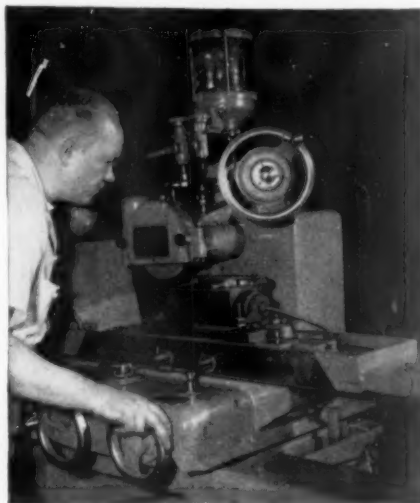
Removes Stock Faster — No Burning or Warping — Repeats Accurately — Lengthens Wheel Life

Mr. William R. Henninge, Tool Room Foreman of the Euclid Plant of Reliance Electric and Engineering Co., Cleveland, credits the extra rigidity and precision accuracy of DoALL Surface Grinders for helping to save much grinding time on a large lamination die punch assembly. Foreman Henninge goes on to state that their DoALL Surface Grinder gave maximum performance because of its ability to hold size properly and repeat accurately. And in addition, the variable hydraulic feed control made it easier for them to attain proper table speeds and grinding stroke length.

The DoALL grinder at Reliance is also equipped with DoALL Cool-Grinding* attachment which added more efficiency to this die grinding job. Cool-Grinding made possible faster stock removal without burning. Stock used on this job was mostly high carbon-high chrome. Punch warpage was reduced, especially on thin punches. And, as a bonus feature, wheel form life was twice as long between dressings.

In Cool-Grinding coolant is metered into the wheel hub, flows through the pores of the wheel and out in a fine mist at the point of contact of the wheel and the work. Thus both the wheel and the work always have coolant present. Cutting temperatures are reduced as much as 400° F.

Get a DoALL grinder demonstration.



View of surface grinder operator working on piece for lamination die punch assembly.

It will show you how any surface grinding job can be done with greater savings in time, material and money. Local DoALL Sales-Service Stores are equipped to demonstrate DoALL Surface Grinders in any plant. A new, revised DoALL Grinder Bulletin is also available.

*U. S. Patent No. 2470350.

Variable Control and Demagnetizer are Features of DoALL "Selectron" Magnetic Chuck Control

Originally developed for use with DoALL Precision Surface Grinders, the DoALL "Selectron" magnetic chuck control has proved to be a welcome addition to other machine tools equipped



with magnetic chucks. The Selectron permits varying the chuck holding power to exert just the right amount of pull to hold heavy pieces for heavy cuts or thin pieces for light work. The Selectron's ability to hold thin work pieces with a low rate of pull over the entire surface is most helpful in preventing distortion during machining. The control also provides 10-second demagnetization of the chuck and work piece after the machining operation is completed.

The DoALL Selectron is a compact unit with four full-wave rectifier tubes for direct current and a special circuit breaker for protection against overloads or voltage surges. Simple dial and switch controls make it easy to operate. Complete information and literature are available upon request.

DoALL Vertical Line-Grinding Salvages \$1500 Worth of Spoiled Gears

Many Repairs, Tool and Die Jobs, Production Runs

Can Be Done Faster and Better by Grinding on a Band Machine

Vertical line-grinding on a DoALL MP-20 Contour-Matic Band Machine proved to be the answer to a manufacturer's prayer recently when a run of gears came through in which the keyways had closed up during heat treat-



DoALL Line-Grinding applied to air-cooled engine castings.

ing. The problem was one of finding an economical, speedy means of re-machining the hardened keyways.

Vertical line-grinding was the only logical answer. The DoALL line-grind tool consists of hundreds of abrasive segments mold-welded to a spring temper steel band. It is installed and operates on the band machine in the same manner as an ordinary saw band. Because of the controlled feed pressure, tool speed and coolant application required, the line-grind band can be used only on the DoALL Contour-matic.

DoALL line-grind bands will cut greater work thicknesses than will a wheel, which grinds only the work area tangent to it. Further, there is no limit to the depth of cut possible with line-grinding. It is the first and only cutting tool and band machine combination that will do precision vertical grinding on outside, inside or contour cuts. Die shops, among others, have always had the need for just such a grinding method in order to meet production runs faster and be assured of saving valu-

able dies that break, warp or require last minute alterations.

Local DoALL Sales-Service Stores will demonstrate vertical line-grinding in any plant, upon request.



Close-up of DoALL Line-Grind Bands showing abrasive segments.

Versatile Band Machine Friction Saws Plates, Cast Wood, Saws All Metals, Plastics

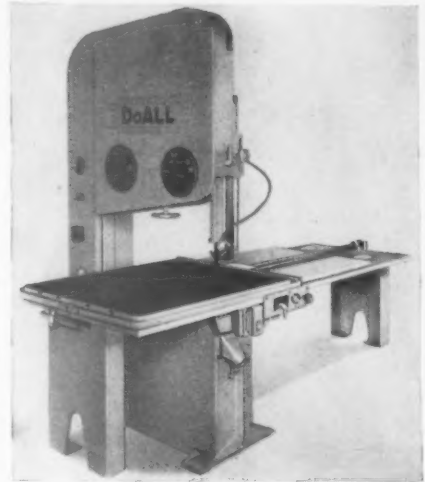
DoALL 36W Zephyr has 40 to 10,000 F.P.M. Speed Range, 36" Throat, 20" Work Clearance

There is practically no limit to the jobs that can be done on the DoALL 36W Zephyr band machine. Foundries use it for friction sawing castings; woodworking plants use it for high speed precision contour sawing; other plants use it to trim stampings, cut plastic shapes, make tools and dies, mach and slot parts, handle production and maintenance jobs. No other machine combines such versatility with comparably large work capacity. The 36W is built rugged with a full 36" throat and 20" clearance under the saw blades. Large work pieces up to 1 ton, such as die blocks, castings, beams, forgings or plates are easily handled at this time, money and material saving machine.

Hydro-Feed Adds Efficiency

When equipped with a DoALL hydraulic stroke feed table, any straight sawing job can be done more quickly and easily on the 36W. With the DoALL Hydro-Feed work is locked to the table, the feed and pressure controls are set and straight cutting is done automatically and accurately with little or no operator effort.

The DoALL Hydro-Feed table comes in two stroke sizes, 16" and 36". The 36" stroke table (see cut) measures 40" x 48" and has four 1/2" full length "T" slots. Feed rate is 0 to 12 F.P.M. forward and 36 F.P.M. reverse. The machine is powered by a 10 H.P. motor with a 3 speed transmission and the table feed is driven by a 3/4 H.P. hydraulic pump motor.



DoALL 36W Zephyr Band Machine with "Hydro-Feed" hydraulic stroke work table.

Local DoALL Sales-Service Stores will demonstrate the 36W Zephyr in any plant, without cost or obligation. For such a demonstration, or literature, call today.

16 Kinds of Saw Bands Available For Any Vertical or Horizontal Band Saw



All vertical or horizontal band saw users can now get immediate delivery of DoALL saw blades for sawing, cutting or friction sawing any ferrous or non-ferrous metal and most all non-metallic materials.

This complete line, carried in stock by DoALL stores throughout North America, includes 16 different types of band tools. Woodworking shops, metal shops, paper fabricators, anyone using a band machine will find real economy with longer-lived DoALL saw bands. DoALL saw bands can be purchased in 100 ft. lengths in the exclusive "strip-out" metal box for safety, convenience and blade protection, in 500 ft. packaged coils, or specially cut and welded lengths to fit your machine.



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STORES THROUGHOUT
THE COUNTRY

GREATEST SELECTION OF
PRECISION GROUND
OIL HARDENING **FLAT STOCK**

AVAILABLE ANYWHERE!

The DoALL Company
254 N. Laurel Ave., Des Plaines, Ill.

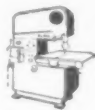


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230
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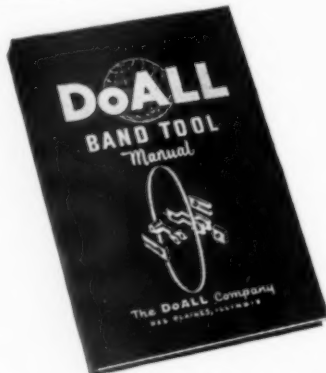


CONTOUR SAWING MACHINES • SURFACE GRINDERS • GAGES • CUTTING TOOLS & INDUSTRIAL SUPPLIES

Two New Educational Textbooks Explain Band Tool Selection and Use — Precision Measurement with Gaging Equipment

DoALL Band Tool Manual

This 160 page book contains a complete and comprehensive discussion of the fundamentals of selection and use of saw bands and other band tools. It deals with dimensional accuracy, surface finish, production rates, tool life and many other factors to help broaden the "know-how" of band sawing and machining.



All 16 types of DoALL band tools for sawing, friction sawing, slicing, filing, grinding, honing and polishing all met-

als, plastics, woods, glass, ceramics, stone, leather, paper and other non-metallics are described and illustrated in actual use. Recommendations are also given regarding band tool selection as concerns, speeds, pitches, feeds, coolants and other related factors necessary for cutting any material. This information is extremely helpful in stepping-up production rates and correcting various production problems. This manual is a practical guide for anyone concerned with the operation of band tools.

This \$2.00 book is available free to persons requesting it on their company letterhead.

The "Science of Precision Measurement"

This entirely new 256 page manual explains the purposes and application of gage blocks, sine bars, optical flats, monolights, electric comparators and statistical systems for the effective use of the standard inch in mechanical production.

Illustrated throughout with two color diagrams and photographs, this book

introduces a new method of measurement using optical flats and the "Visible Scale." It shows how to measure and establish angles, surface flatness and parallelism and other inspection processes.



dures invaluable to quality control engineers, supervisors, production and tool inspectors. No other publication is more comprehensive in its presentation of these quality control subjects.

This \$3.50 book is available free to engineers, inspectors or executives who request it on their company letterheads.



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Call DoALL: Charlotte 4-2579

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Here's a standard Vertical Pull-Up

LAPOINTE BROACHING MACHINE

.....with possibilities!

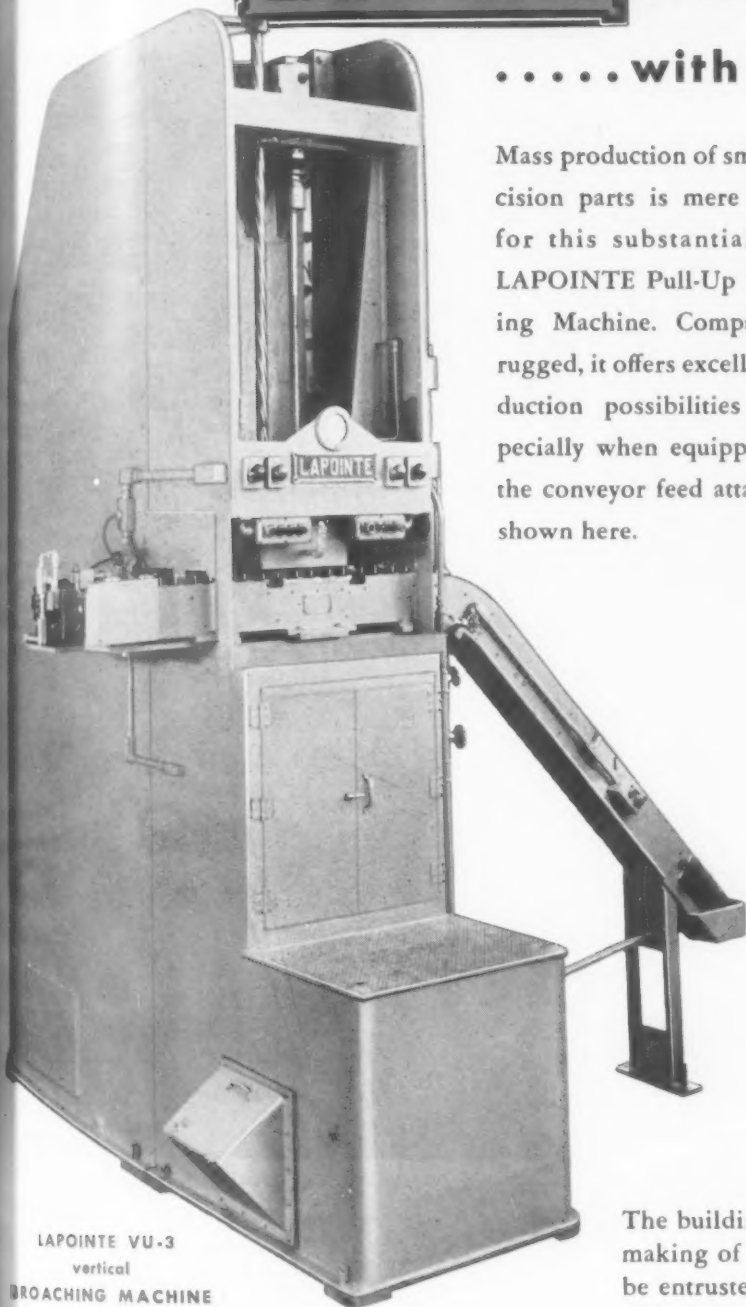
Mass production of small precision parts is mere routine for this substantial, *rigid* LAPOINTE Pull-Up Broaching Machine. Compact and rugged, it offers excellent production possibilities — especially when equipped with the conveyor feed attachment shown here.



For example: Rough broaching 61 teeth (special pitch, generated involute tooth form) in this 4-inch diameter steel forging **transmission gear blank**, is done at a speed of 200 parts per hour, at 80% efficiency.

The electrically driven transfer fixture is bent on a 45° angle to convenient loading height. This eliminates expensive pitting of machine. A spiral fixture, driven by a lead bar, drives the work by friction of shoulder. Fixture, machine and transfer conveyor are fully automatic. (The machine will not cycle if the broach is out of position.)

The building of broaching machines, the designing and making of broaches and special fixtures — all can safely be entrusted to LAPOINTE. Here in the world's oldest and largest broaching machine plant, you will find an accumulation of *engineering experience in broaching unequalled elsewhere.*



LAPOINTE VU-3
vertical
BROACHING MACHINE
15 Ton, 40-inch Stroke

THE *Lapointe*

Specifications of all LAPOINTE vertical pull-up Broaching Machines are given in our Bulletin VPU-5. Write for it.

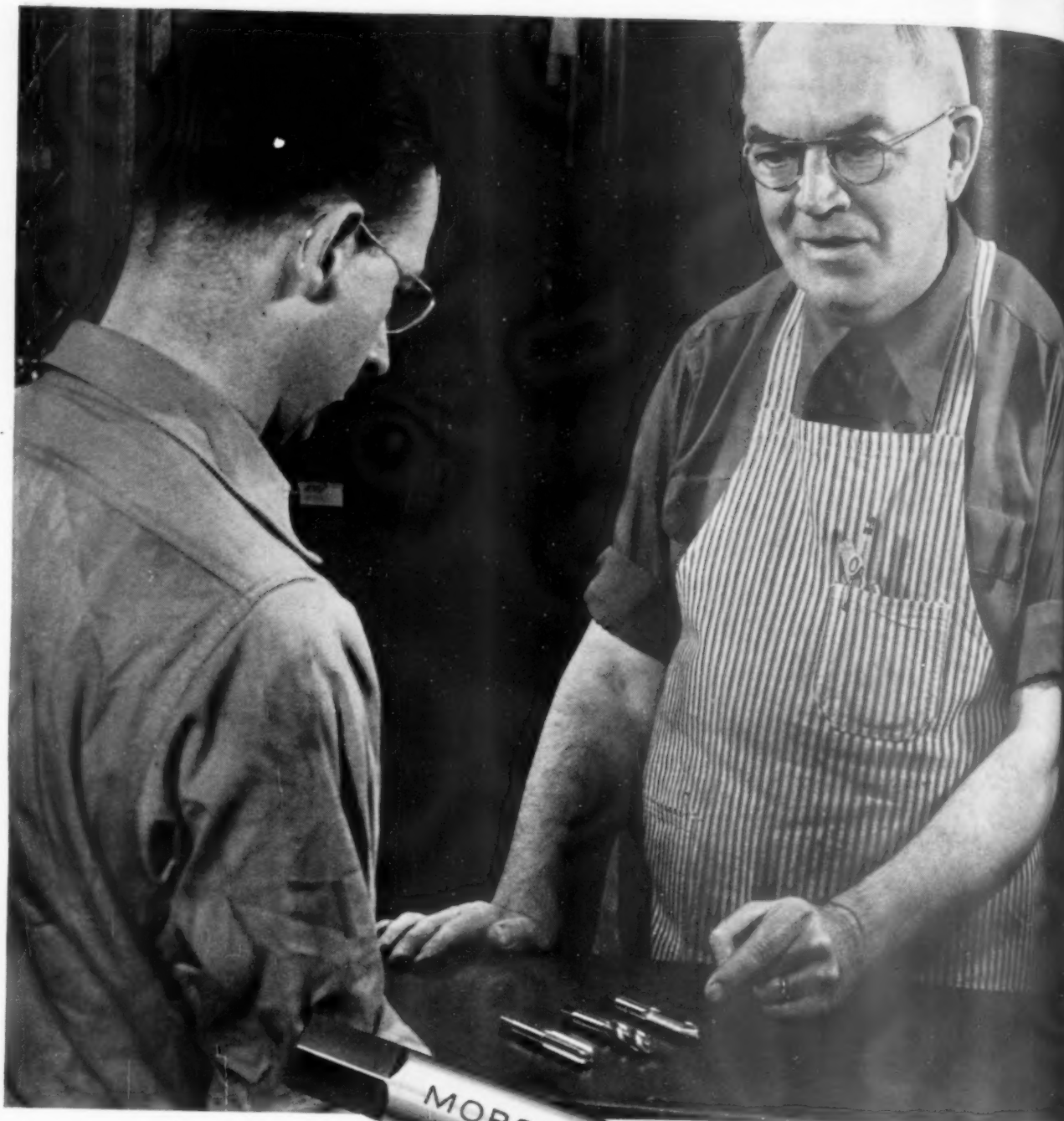
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THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES



"MORSE TAPS?"

Sure - how do you want 'em
... straight flute ... spiral flute
... or spiral point?"

For regular shop practice, Morse Straight-Fluted Taps are the answer in most materials.

But on "stringy" ferrous materials where straight-fluted taps won't cut clean threads ... get shear-cutting, Morse Spiral Pointed Taps that push the chips ahead and *out*.

And if those bulky, non-ferrous chips are hard to remove ... then get Morse Spiral Fluted Taps that simplify chip removal problems by drawing the chips out of the hole.

All these three types of Morse Taps have ample rake angle to handle a wide variety of materials. And all are available in fractional or machine-screw sizes, with one or more chamfers. So see your Morse-Franchised Distributor today about the right Morse Taps for *your* work.

MORSE TWIST DRILL & MACHINE CO.

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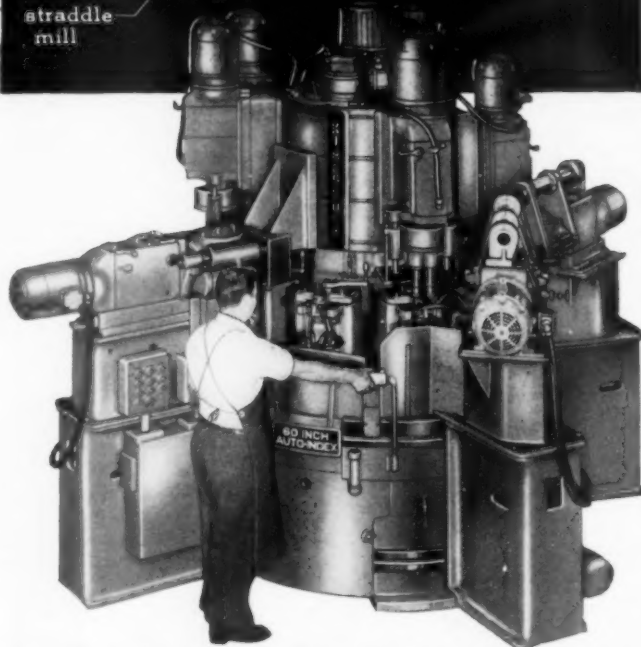
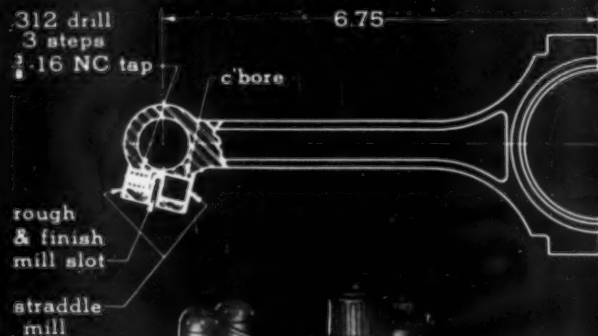
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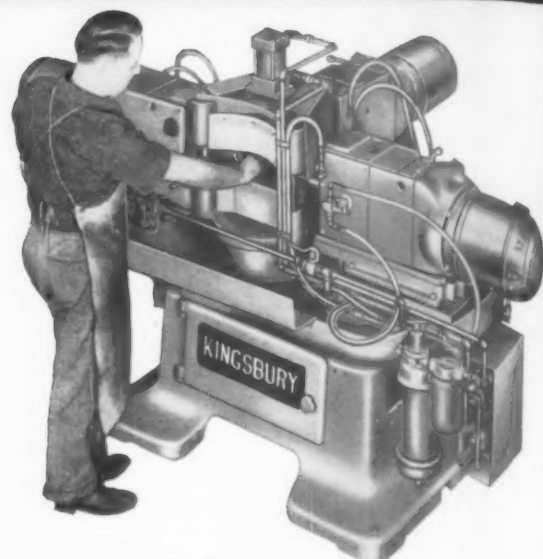
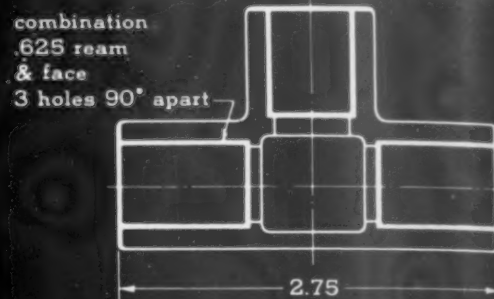
Cutting Tools

Connecting rod $1\frac{8}{10}\text{¢}$ per part for 11 operations from 3 directions



500 PARTS AN HOUR GROSS. Each fixture on this 60-inch "Auto-Index" holds two parts. Horizontal units mill both parts with one cutter. Vertical units on the central column do the holes with two-spindle heads; the counterboring head is inverted.

Brass tee $\frac{8}{10}\text{¢}$ per part for 3 operations from 3 directions



500 PARTS AN HOUR GROSS. The operator just removes a finished part, replaces it and presses a lever. The machine automatically clamps the work, operates the opposed tools and then the third tool and unclamps the work. There is no indexing.

How much do you pay for 9

A study of four special drilling and tapping machines that produce at the same rate: 500 parts an hour gross

Dear Sir:

At 80% efficiency each of these Kingsburys averages one finished part every nine seconds. What would that much production cost you?

Each drawing shows the cost for the man and his Kingsbury — no power or overhead. The cost for each man is the same — one 400th part of today's national hourly wage rate. (The 400 is from 3600 secs. in an hour ÷ 9.)

The difference in costs is in the machines, of course. Notice how small this difference is — just one cent be-

tween the highest and the lowest, the Connecting Rod and the Brass Tee.

What a difference

Yet the total price of the Rod machine is *seven times* that of the Tee machine. The Rod machine is a massive affair — an 84-inch base with four knees and a central column, nine operating units and a 60-inch power index unit with ten work fixtures that alone weigh 1.2 tons. The Tee machine has just a 68-inch base, three drilling units and one work fixture.

But in unit costs the difference is

just one cent, on the basis of amortizing the entire investments in machine and tooling over 6000 hours, a fraction of the useful lives.

Naturally your figuring might be different. But on a high production basis your costs should be close to ours. With low production — well, that's something else again.

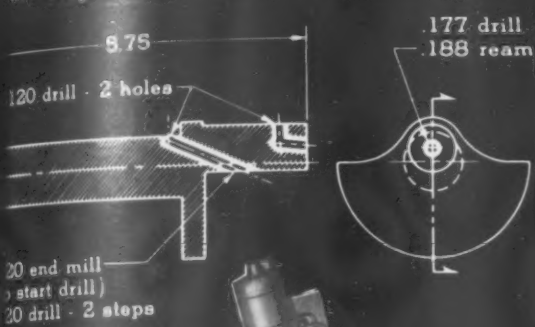
Meets your specifications

All four of these Kingsburys have the same hourly production rate — 500 parts gross or 400 parts at 80% efficiency. We picked them this way on purpose for this comparison.

Actually we design, build and tool each machine to meet each customer's specifications — the operations he

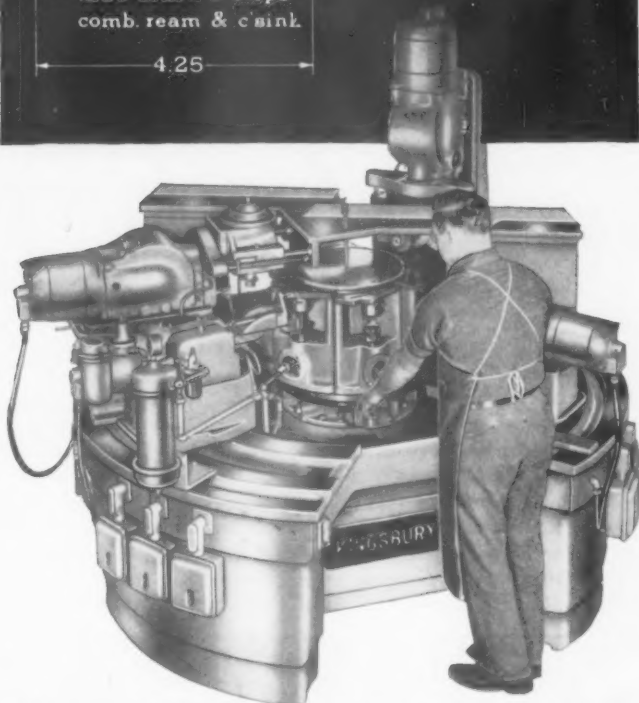
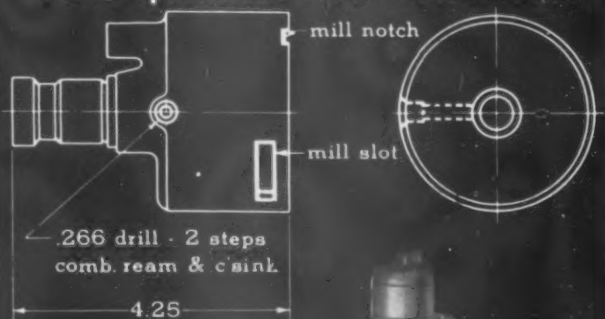
crankshaft
for 7 operations from 3 directions

1.1¢ per part



Distributor base
for 5 operations from 3 directions

1.0¢ per part



50 PARTS AN HOUR GROSS. A 20-inch power index table has seven fixtures. Three horizontal units end mill and drill the .120 hole. The inverted angular unit drills two .120 holes. Two hidden angular units drill and ream the .188 hole.

500 PARTS AN HOUR GROSS. All units on this 20-inch index machine are off the radial lines through the fixtures. Three horizontal units for the hole are 20° left. Another for the slot is 30° right. The vertical unit that mills the notch is 10° right.

9 seconds of production?

names, the production rate he names. Among other things, each of these customers wanted operations from three directions in one chucking. It was easy for the Brass Tee since each piece needed just one operation. A semi-index machine with three automatic drilling units did the trick.

It takes ingenuity

The other three machines had index tables, so it took more ingenuity to work from three directions. The Connecting Rod machine has the usual horizontal and vertical units plus a vertical unit with an inverted auxiliary head that counterbores from below. The units for the Crankshaft are horizontal and at two different

angles. For the Distributor Base one unit is vertical and the others are horizontal but at angles to the radial center lines through the work fixtures.

That is, of course, just part of the problem. It takes ingenuity to design a fixture that will hold the work firmly, locate it properly, and still leave room for the tools to operate and the chips to escape. It takes ingenuity to mount all fixtures in

exact location on the index table so that all finished parts are fully accurate and uniform. It takes ingenuity on this type of equipment to locate tools to close tolerances.

We feel sure we have the ingenuity to design, build and tool a machine that will meet your requirements.

Sincerely,

Kingsbury Machine Tool Corp.
97 Laurel Street, Keene, N. H.

KINGSBURY

**AUTOMATIC DRILLING
& TAPPING MACHINES**
for Low-Cost High Production

For 100% Performance get "RED END" Power Hack-Saw Blades

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SIMONDS
Quality-Controlled

Cut-ability ... that's the word for "Red End" Power Blades! *Cut-ability* that starts with special Simonds hack-saw steel, double checked for toughness and grain structure. *Cut-ability* that proves out *and pays off* on the job with straight fast cuts and *more cuts* per blade. Supplied in all standard sizes with a choice of these two types of steel:

High Speed Molybdenum for cutting mild alloys and general work where breakage-resistance and long life are musts.

High Speed Tungsten for top cutting efficiency on toughest alloy steels where abrasion-resistance is vital.



Order Simonds "Red End" Power Blades from your Industrial Supply Distributor.



SIMONDS
SAW AND STEEL CO.

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McCROSKY

Newly Developed

UNIVERSAL LINE

Super-Jack

MILLING CUTTERS

Highly Economical for Short or Long Runs in Different Metals
Also for Fine Pitch, Higher Speed, Faster Feed Milling with Carbide

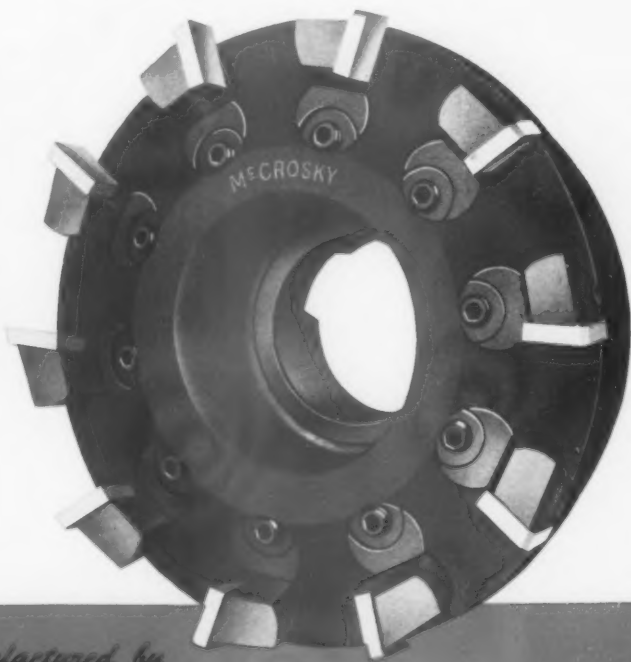
Just One Body

for

High-Speed Steel or Carbide Blades

Right-Hand or Left-Hand Rotation

Positive or Negative Angles



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**TOOL
CORPORATION**
MEADVILLE, PA.

**COST
CUTTING
TOOLS**

Jack-Lock Milling Cutters

Super Adjustable Reamers

Block Type Boring Bars

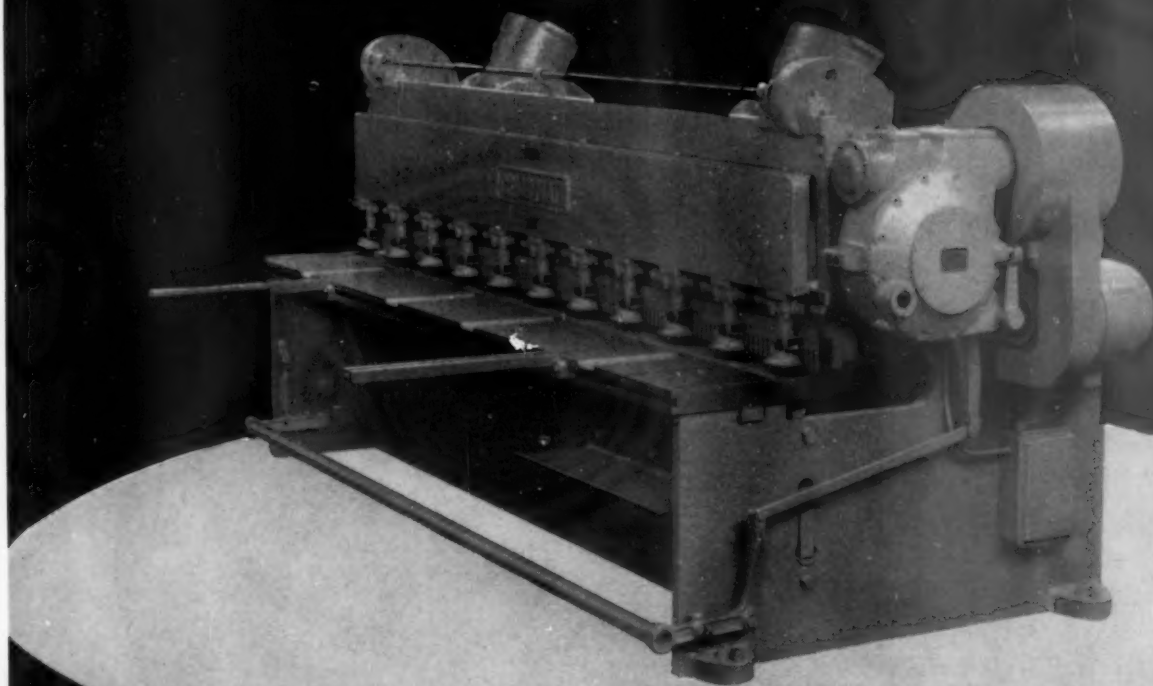
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Wizard Quick-Change Chucks

Special Multiple Operation Tools

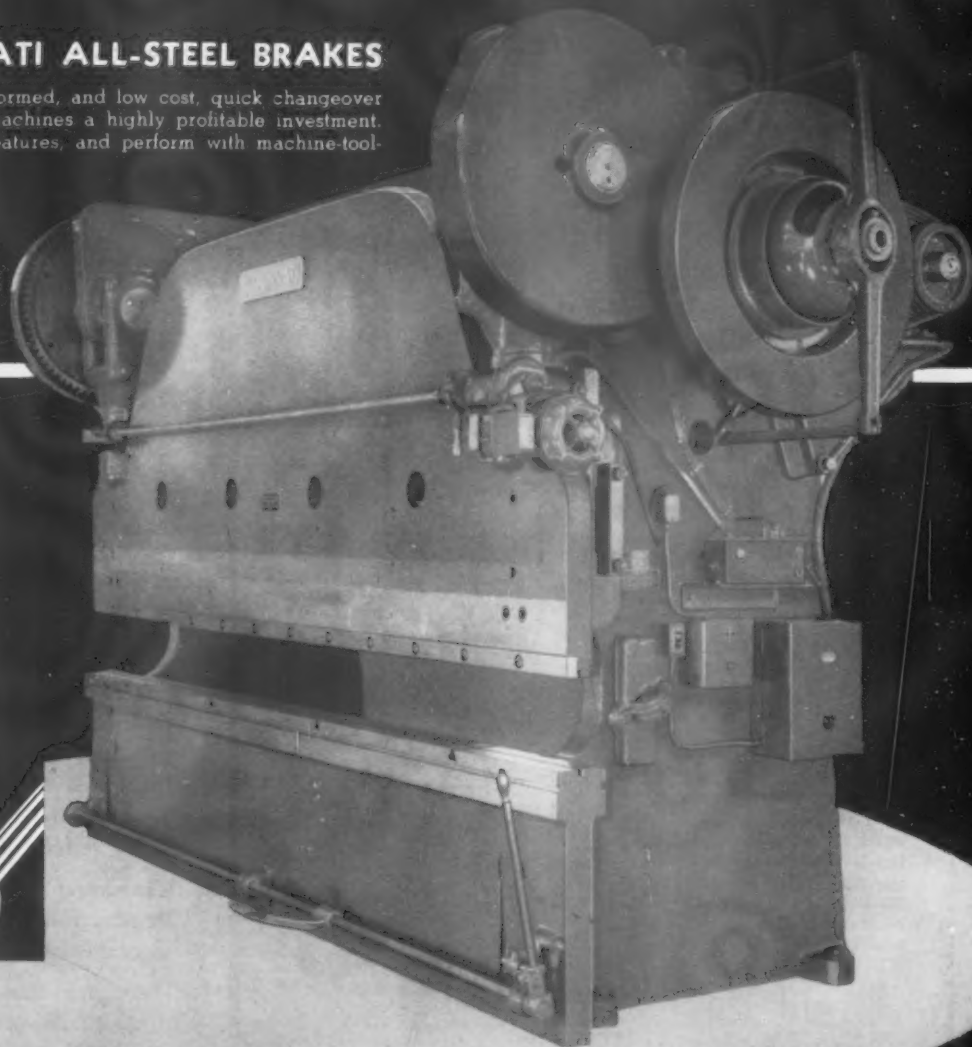
CINCINNATI ALL-STEEL SHEARS

These modern machines have up-to-date controls, accurate and rapid gauging devices, and powerful and efficient hydraulic holdowns. Cincinnati All-Steel Shears cut straight and clean, and have every convenience for rapid and accurate shearing.



CINCINNATI ALL-STEEL BRAKES

The great variety of work performed, and low cost, quick changeover from job to job, make these machines a highly profitable investment. They have the most modern features, and perform with machine-tool-like accuracy on any job.



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



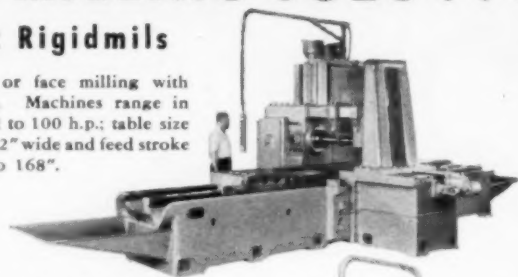
Cut Metal Working Costs

With These **SUNDSTRAND** Machines and "Engineered Production" Service

FOR MILLING JOBS . . .

Simplex Rigidmils

Perform slab or face milling with single spindle. Machines range in size from 1-1/2 to 100 h.p.; table size from 8" up to 42" wide and feed stroke from 12" up to 168".



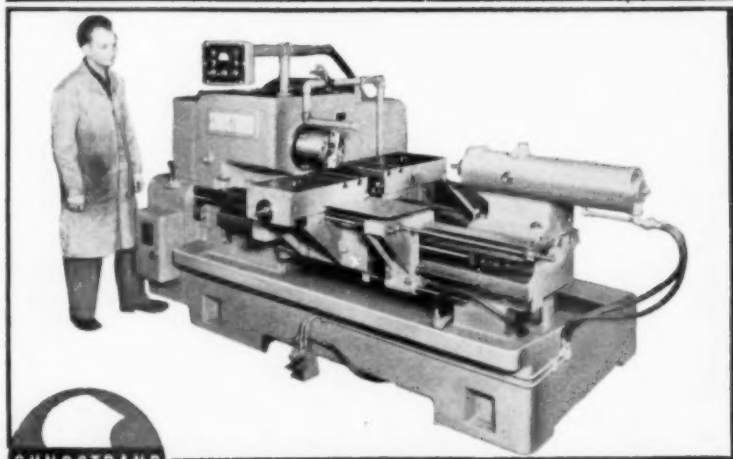
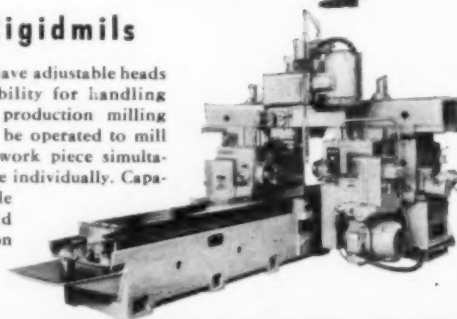
Duplex Rigidmils

Have two opposed heads which are mounted on adjustable columns to facilitate wider range of work. Machines can be furnished with power adjusted or fixed columns.



Triplex Rigidmils

These machines have adjustable heads which add flexibility for handling wider range of production milling jobs. Heads can be operated to mill three sides of a work piece simultaneously or operate individually. Capacity of heads, table widths and feed strokes available on request.



RIGIDMILS

• AUTOMATIC LATHES

• HYDRAULIC EQUIPMENT

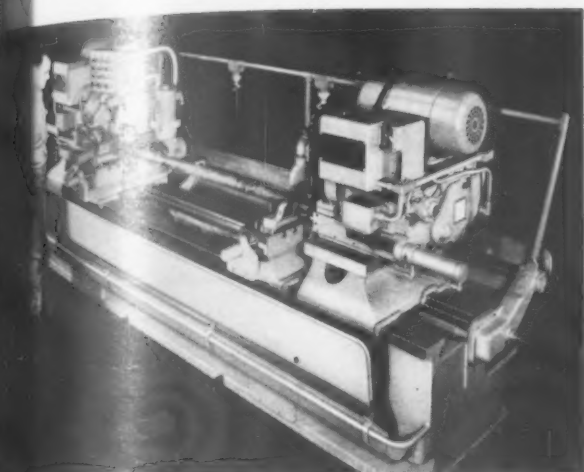
Basically, there are two approaches to solving production milling problems, (1) obtaining standard machines, then trying to process parts over these machines so as to meet production requirements, (2) designing the most productive processing method, then obtaining machines to suit this method — standard or semi-standard machines, if possible, or entirely special machines, if necessary.

This latter method is Sundstrand "Engineered Production" . . . the most practical approach to economical metal working production.

Here are some representative examples of these machine tools and services offered by the Machine Tool Division of Sundstrand. Standard basic machine designs and units coupled with methods engineering assistance have resulted in many cost-saving Sundstrand installations. If you have metalworking operations in your plant and are interested in lowering manufacturing costs, call in a Sundstrand representative. He'll be glad to assist you in obtaining more economical methods. There is no obligation for this service.

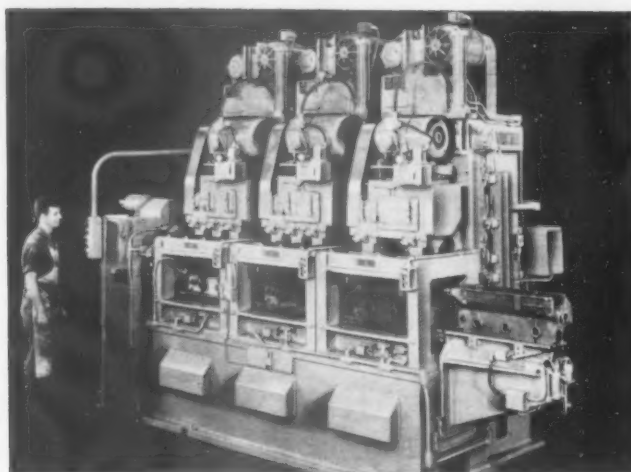
◀ For Both Short-Run and Mass Production, Use SUNDSTRAND Automatic Lathes and ENGINEERING ASSISTANCE

Sundstrand Models 4A, 8A, 12A and 16 single spindle Automatic Lathes handle a wide variety of short and long run turning, boring, facing, or forming operations. Machines can be furnished with one, two or three tool slides. Sundstrand Automatic Lathes are available in varying speed combinations and lengths with work capacities ranging from 3 to 75 h.p.



Mill and Center In One Operation

Save time and get more accurate work with a Sundstrand Milling and Centering Machine, because it mills to length and centers in the same set-up. The work is handled once instead of twice. Extreme accuracy is obtained by performing both operations with a single clamping of the part, thereby maintaining a definite relation between the ends and centers. Shown is a Sundstrand Milling and Centering machine for handling a range of work from 1" to 3-1/2" diameter and 6" to 48" long. Other sizes are available.

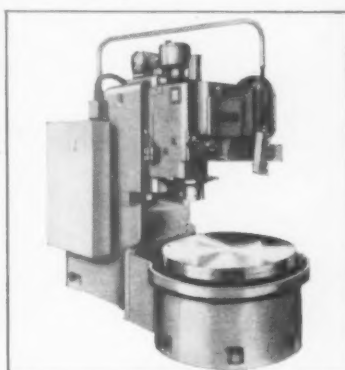
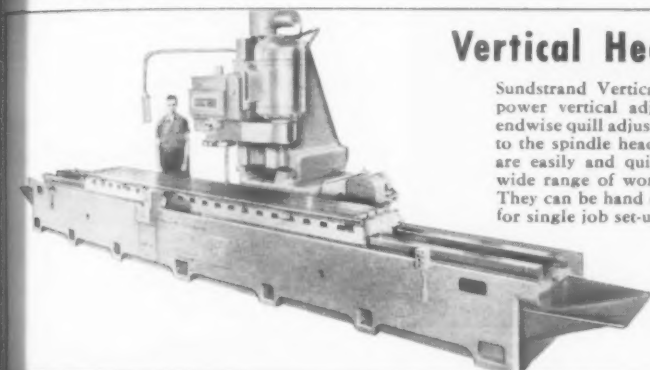


Special Machines for Milling, Turning, Boring and Centering

When standard machines cannot be tooled to suit your needs or if your production requires the purchase of too many duplicate standard machines, ask Sundstrand engineers to work out a practical solution in the form of a special machine tool. For instance, the machine above is a special "Rise-and-Fall" machine which automatically mills the bearing faces of a motor block.

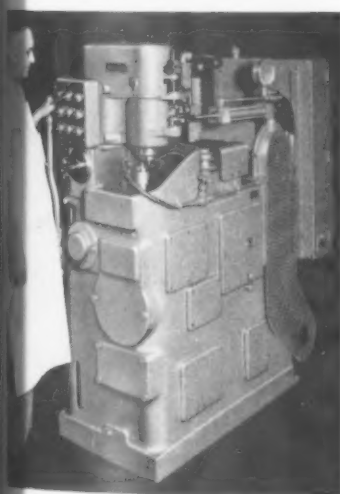
Vertical Head Rigidmils

Sundstrand Vertical Spindle Rigidmils have power vertical adjustment to spindle head, endwise quill adjustment and cross adjustment to the spindle head carrier. These machines are easily and quickly adjusted to handle a wide range of work and to simplify set-ups. They can be hand controlled by push buttons for single job set-ups — or automatically controlled by dogs on the front of the machine table for a wide variety of table cycles in production milling work.



Contour Milling Machines

Sundstrand contour milling machines are adaptable to many cam milling operations on sewing machines, guns, business machines, governors and other small parts. A single vertical spindle cam-controlled, hydraulically operated milling machine, it is provided with one vertical cutter spindle and one cam follower spindle, mounted together on a pivoting arm. Ratio between cam roller arm and cutter arm is 2 to 1 which reduces any cam error 1/2 on the finished part. Also, master cam, in most cases, can be made considerably larger than the work piece so as to eliminate excessive cam rises.



Vertical Rotary Rigidmils

Sundstrand Rotary Rigidmils are available in three standard sizes with 36" and 48" diameter tables. They have way type cross adjustment of the spindle head carrier and way type vertical adjustment to the spindle head so as to provide maximum support to the cutter for either large or small parts. The adjustable swinging pendant permits easy access to the machine controls from any operating position. Power adjustment is optional for both the spindle head and the spindle head carrier.

**FREE
Additional
Data**



**SUNDSTRAND
Machine Tool Company**

2540 Eleventh St. Rockford, Ill., U.S.A.

on any or all of these machines is available. For complete set of literature ask for Bulletin 717.

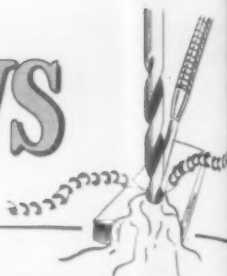
DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES

Production News

ABOUT *Lusol*..—THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY • PORTLAND, CONNECTICUT



4 TOOLS NOW DO THE WORK OF 18 WITH LUSOL IN THEIR MONARCH LATHES



This motor shaft is tough on tools. 18 a day were required until a 25:1 Lusol solution was put in each Monarch Lathe. Now they use only 4 tools per day for the same production and same fine finish.

Unusual? Not at all! Reports of greatly increased tool life, faster machining and better finishes are the usual thing where Lusol is at work. Plant managers tell us that, when they put Lusol in one machine, they soon have other operators asking for it. They like Lusol.

Rolling with Lusol

We never stop learning about Lusol. There are always production men with ability and curiosity trying it for new and different operations. Rolling sheet is one of these.

Testimony from a large brass company and a manufacturer of rolls convinces us that Lusol does more than ordinary rolling fluids. It prevents slippage. It carries heat away rapidly. Very evident-

ly, Lusol maintains a continuous, tough film between the rolls and the sheet. This is not surprising, for we know that Lusol has extreme pressure characteristics. This means that Lusol prevents metal pickup. Rolls last longer. Sheet comes out smooth and free from deformities. Temperatures of rolling solutions have dropped 10°F. on the average. Worth investigating?

users say*

case histories of Lusol at work

A TOOL BUILDER—"Drill lands and flats stay sharp on deep drilling with Lusol, where we used to have a lot of trouble."

A ROLL GRINDER—"Eight hours grinding time, required for finishing four diameters in a step roll, was cut to six hours by changing to Lusol. And they improved the finish."

A GEAR MAKER—"Only four pieces were formerly produced before milling cutters had to be ground. The solution smoked badly. After changing to Lusol, 8 and 9 pieces per cutter are obtained, and the work remains cool."

A DIESEL ENGINE BUILDER—"Two Minster punch presses automatically feed steel strip, blank and pierce pole-piece laminations for electrical generators. A small stream of Lusol flows onto the strip as it enters the dies. Used to smoke up the place, but there's none now, and the parts come out clean."

(*Case histories of Lusol at work)



FREE BOOK

Get complete facts about Lusol by writing for this 20-page booklet. It contains information on machine cleaning, maintenance of Lusol solutions, elimination of dermatitis and odor in machines, plus many case histories of Lusol at work. Write F. E. Anderson Oil Company, 213C, Portland, Conn.

The Tool Engineer

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THE TOOL ENGINEER

Publication of The American Society of Tool Engineers

a Letter from the Editor...

This month's cover leads a number of special features contained in this month's TOOL ENGINEER. Dedicated to the tool engineer and his vital place in today's economy, the March issue was selected some months ago as the number which would undertake several basic studies of the tool engineering profession.

The cover, by Edmund Izzi and H. J. Zukauskas of Pittsburgh, is an abstract portrayal of American industry's dual role—guns and butter, as it has been called. Military production is symbolized by the tank treads shown vertically in the grouping, and the white box coming off the conveyor line represents our civilian production. The element of time is symbolized by the clock at right, and the background of gear teeth indicates the tooling behind all modern production.

This abstract, incidentally, is a three-dimensional grouping, made of wire, wood and sheet metals. The final assembly was photographed to produce our cover.

Getting further into this issue, there are four studies which are of importance to every tool engineer. The first, a practical blueprint of what a tool engineering organization should be, is THE TOOL ENGINEER's contribution towards a clarification of the tool engineering function. We believe that certain policies outlined in this report will provoke discussion; we would like to have your comments.

One of the automobile industry's pioneer tool engineers traces the effect which the tool engineer has had over the past several decades on machine tool design. A staff-written report presents industry's case for integrated, continuous tool engineering activity as part of a permanent war against high production costs. And the study on production planning hits at the fundamentals of tool engineering functions.

Some of these studies will be followed up with additional specific case histories in future issues; we believe they should form a part of the tool engineer's library.

Gilbert P. Muir

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*in my
machine tools
and
equipment?*



IF YOU HAVE a push, pull, lift, press, clamp or control problem, Hanna Cylinder Power can be the answer. The mechanical movements here illustrated may suggest ways Hanna Cylinders can be used to simplify the actuation and control of machines or equipment and to replace or reduce manual effort.

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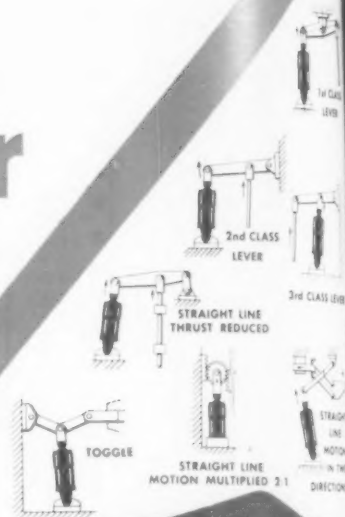
Get the complete story of how you can put Cylinder Power to work. Request Catalog 233A describing Hanna High Pressure Cylinders, Catalog 236 covering Low Pressure Cylinders, and Catalog 254 with complete details on Hanna Cylinder Control Valves and Circuits.



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HYDRAULIC AND PNEUMATIC EQUIPMENT... CYLINDERS... VALVES... RIVETERS



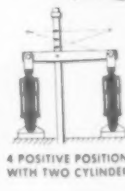
*here are basic
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MECHANICAL MOVEMENTS
that can be put to work
for YOU!*



STRAIGHT PUSH



TRAMMEL PLATE



4 POSITIVE POSITIONS WITH TWO CYLINDERS



HORIZONTAL PARALLEL MOTION

GET THE INSIDE STORY

on these mechanical movements at the

**A S T E EXPOSITION
CHICAGO—MARCH 17-21.**

See Cylinder Power In Action in the Hanna Booth 1625.

The Tool Engineer

Editorial

Progress vs. Understanding

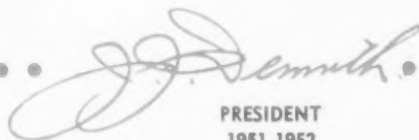
Industry today faces a challenge that is in addition a responsibility. It must begin immediately and with increasing emphasis to tell the story of tool engineering to the American public.

The facts are simple. There is no argument today with the fact that higher and higher production per man-hour of effort is our nation's answer to manufactured products which can be sold at a price that the wage earner can afford. Most of the responsibility for this accomplishment, in terms of lower manufacturing cost, is held by the tool engineering profession. The transfer machines, the automatic operations, the improved materials we have developed have performed manufacturing miracles in terms of required human effort at present as opposed to, say a hundred years ago.

Economists and simple logic have proved that the effect of reducing man-hours necessary to turn out a part is, in virtually every instance, more plants, more people and more machines to produce that part because more people can afford to buy it and the market expands accordingly.

The unfortunate fact is that even today there is widespread misunderstanding of this principle—literally a principle that is fundamental to our system of free enterprise. American industry today is afraid in too many instances to discuss labor savings in new equipment because of an understandable fear of bad public relations resulting from organized and unorganized misunderstanding of how to create new jobs with lower costs and increased markets.

Thus industry has the responsibility of explaining to the American public what tool engineering is, what it effects in terms of lessened human effort, and how it benefits the consumer by providing the foundation for a quality manufactured product at a price that he can afford.



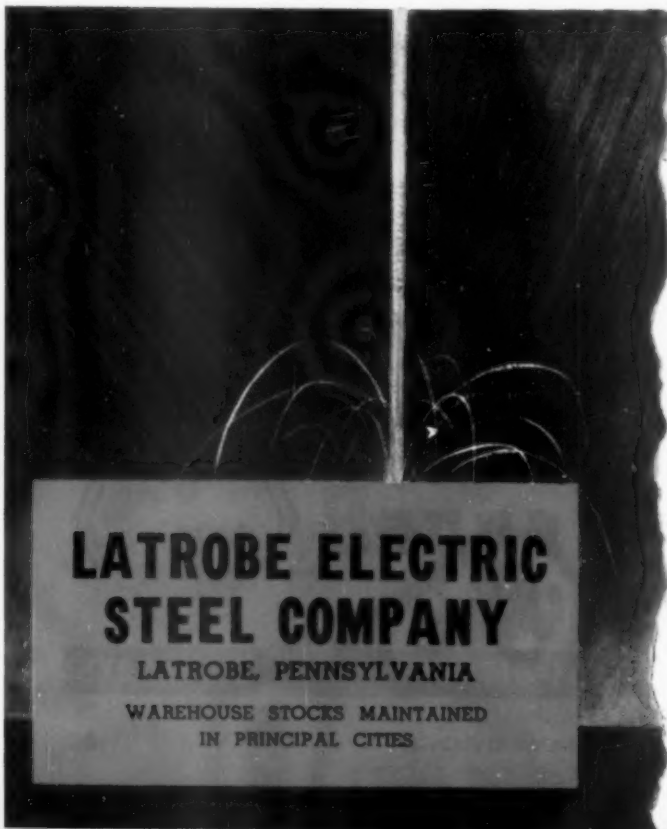
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Part I

Mobilization in Chicago	38
You'll Enjoy Chicago	42
Program	44
ASTE's National Program and Exposition Committees	53
Chicago Chapter Show Committee	54
Ladies Activities	55
Restaurant Guide	56

Mobilization in Chicago

By Nancy L. Morgan



Presses of up to 16,000 tons capacity
manufactured at Clearing Machine Co.



Ingredients for an unbeatable combination—a policy making address by Defense Mobilizer Charles E. Wilson, 14 selected tours of important plant operations, 47 information-packed technical sessions, 386 topflight exhibits, and the most extensive radio and television coverage ever given to the Society—will blend on March 17-21 in Chicago for the greatest Annual Meeting and Exposition of ASTE.

Chicagos' mayor has set aside the days of the exposition in honor of ASTE and the following proclamation has been issued by Illinois' Gov. Adlai Stevenson.

WHEREAS, The American Society of Tool Engineers, representing some twenty thousand production engineers and executives, is to hold a great industrial exposition in Chicago, and

WHEREAS, In connection with this exposition, the Society is sponsoring an extensive series of technical sessions and forums for the consideration of specific vital production problems now confronting American industry, and

WHEREAS, The work of tool engineers and executives is of utmost importance in our national defense program,

NOW, THEREFORE, I, Adlai E. Stevenson, Governor of the State of Illinois, do hereby proclaim the week of March 17 to 21, of the present year as TOOLING FOR SECURITY WEEK throughout Illinois and request appropriate observance of the period.

Mr. Wilson, former president of the General Electric Co., will deliver the keynote speech at the banquet Thursday at the Conrad Hilton Hotel.



One line wire and other products used by System are made at Western Electric.



Milling the base for a large mechanical press at Verson Allsteel Press Co. The firm's newly-opened die shop will be featured on ASTE plant tours in Chicago.

"Can We Have Both Guns and Butter?" will be the discussion question for the March 16 program of the Northwestern University Reviewing Stand to be aired over the coast-to-coast facilities of WGN and the Mutual Broadcasting System.

Participating will be A. M. Sargent, past president of ASTE and president of the Pioneer Eng. and Mfg. Co.; John S. Coleman, president of Burroughs Adding Machine Co.; and a representative of the federal government.

Television Coverage

Plans are being completed for ASTE newsreel coverage, television and radio interviews and a spot on the Dave Garroway telecast of 'Today'.

The exposition will be open from 9 a.m. until 6 p.m. daily although no one can be admitted or registered after 5. Frequent bus service will be provided between the Amphitheatre and the Bismarck, Blackstone, Harrison, La Salle, Morrison, Palmer House and Conrad Hilton hotels. One dollar will buy three bus tickets.

Special exposition services include a first-class restaurant, lounge space for business discussions and complete telephone facilities.

Registration hours at the Conrad Hilton will run from 8:30 a.m. to 8:30 p.m. The fee of one dollar will admit registrants to technical sessions and to the exposition.

The Feature Day programs have been set up to coordinate technical lectures and panel discussions with a particular phase of exhibits each day throughout the week.

A special desk at the Conrad Hilton will be set up to take plant tour registrations. Those planning to visit any

of the Chicago companies participating in the tour program can sign up from 2-8:30 p.m.

Show officials emphasize the importance of all plant visitors carrying positive identification of citizenship.

All plant tour buses will leave from the Conrad Hilton at 9 a.m. and will return to the Amphitheatre around noon. Transportation will cost one dollar per round trip.

The 20th Annual Meeting of the board of directors will convene at 9:30 a.m., Sunday, March 16, at the Conrad Hilton. New officers elected by the board will be installed at the informal banquet on Thursday evening.

House of Delegates

The caucus of the House of Delegates will also be held Sunday at the Conrad Hilton. The 11-hour meeting in the west ballroom will begin at noon. The following morning at 9:30, the House of Delegates will meet again to elect the men to serve on the 1952-53 board of directors.

Jay N. Edmondson, chairman of the National Education Committee, has called a meeting for 9:30 a.m. Monday to discuss current and future education plans.

Past presidents of the Society will gather at the Conrad Hilton on Thursday for a special luncheon in their honor.

'Industry in Action' could well be the theme for the 14 plant tours scheduled in conjunction with the Exposition. A variety of manufacture, from paint to presses, will be studied during the five-day program.

The most recent addition to the list of plants open for Society visitation is the Sherwin-Williams Co. Tours of the

paint firm are planned for Tuesday and Thursday.

The production facilities at Scully-Jones and Co., manufacturers of standard and special tools for metal-working plants throughout the United States, Canada and many foreign countries will be open to ASTE guests.

Established in 1912 with five employees, the firm has grown in physical space until it now occupies 90,000 square feet and has an employment of 400 persons.

Manufacturers of the 'arms and hands' for machine tools, Scully-Jones designs and makes drill and tap chucks, milling machine arbors and adapters, recessing tools, floating holders, adjustable adapters for multiple spindles, quick change chucks and boring machine tools.

A staff of 70 tool engineers does engineering and design work for firms requiring outside service on product design, production methods and processing; drafting and tool, die, fixture, gage, jig and machine design.

Motorola Tour

A film on operations at Motorola, Inc., will highlight trips through the radio and television company. Actual production of consumer products will be viewed, from the receiving of materials through inspection, materials control, to the finished sets rolling off the assembly line. Guides will hold a discussion period after the tour.

Builder of some of the largest presses manufactured in the United States, Clearing Machine Corp. will take visitors through its huge plant where hydraulic presses of up to 16,000 tons capacity and mechanical presses up to 4,000 tons are turned out.



An aerial view of the Loop in Chicago show several of the city's most well-known buildings. Michigan Ave. cuts down from the upper left.



The Museum of Natural History attracts thousands to Chicago every year and is included on a supplementary program during the Exposition week.

Bright lights and a misty night in the Windy City produce a striking scene taken from a bridge which spans the Chicago River.



The majority of presses made at Clearing are used for metal stamping work in the automotive field as well as the electrical appliance, plumbing ware and furniture industries.

Of particular interest in this age of fast-moving engineering developments will be the visits to the Aircraft Engine Division of the Ford Motor Co. and the Electro Motive Division of General Motors Corp.

Western Electric's oldest and largest many manufacturing plants, the Hawthorne works on the Chicago-Cicero borderline will conduct ASTE tours through the production of equipment for the Bell Telephone System.

Visitors will see the firm's tool room, where fine precision tools are scientifically placed in surroundings optically calculated to reduce fatigue and to produce maximum visibility for work with close tolerances.

More than 21,000 persons are employed in the manufacture of telephone cable, automatic dial equipment for telephone exchanges and associated items. The many buildings at Hawthorne including restaurants, hospital, and stores, contain four million square feet of factory space and occupy a 128-acre tract.

The South Chicago plant of United States Steel Co. will also be inspected by exposition visitors. The third largest steel mill in the world, the South Works occupies 574 acres and produces 4,675,000 net tons of steel annually.

Facilities include 11 blast furnaces, 31 open hearth furnaces, three Bessemer converters and eight electric furnaces. Twelve rolling mills shape steel into a wide variety of products—pig iron, billets, slabs, plates, structural shapes, angle bars and joints and floor plates.

International Harvester

Two phases of manufacturing, activities at the Manufacturing Research Division and actual production of the Melrose Park Works, will be viewed at International Harvester Co.

The company builds industrial and farm tractors, carbureted and diesel type engines, and power units. Engines are also manufactured for nearly 100 outside firms.

New developments in the engineering field is the prime concern of the Research Division.

Opportunity will be given visitors at the Thor Corp. to see methods used in the manufacture of automatic washing machines. The modern foundry (capacity, 50 tons daily), where small castings are made, the machine shop, punch press and sheet metal departments and the assembly line are all included in the tour.

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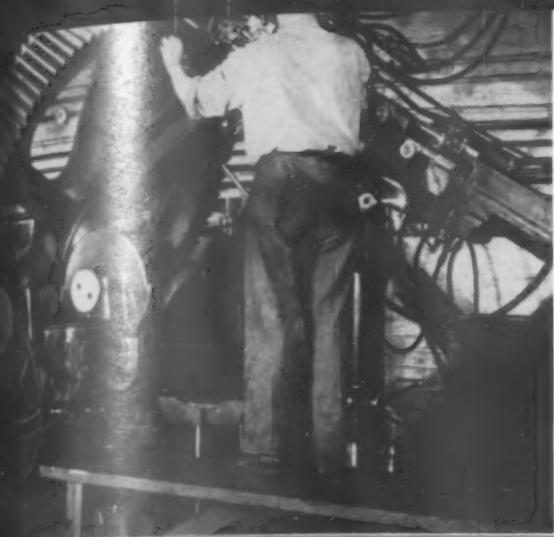
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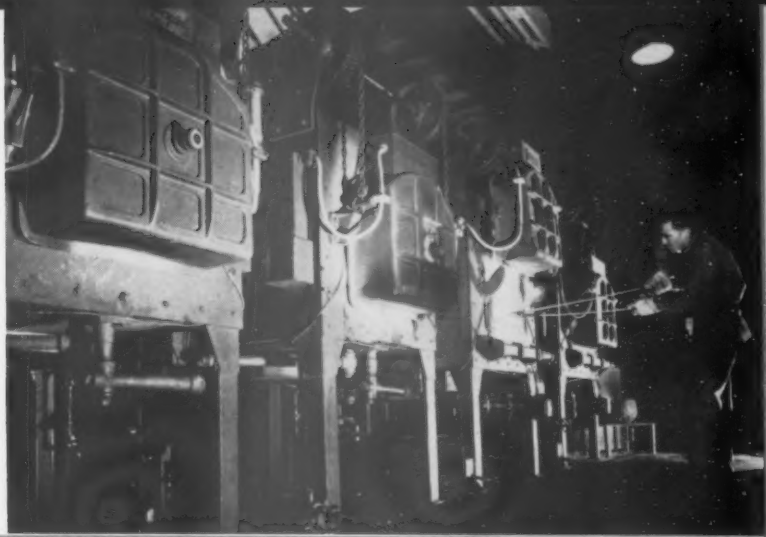
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March, 1952



Large drive gear is positioned in preparation for processing at Lindberg Steel Treating Co.



Visitors at Lindberg will see heat treating of all types of metals, including atmosphere treating used to maintain dimensional stability.

The newly-opened die shop will be an attraction at Verson Allsteel Press Co. The firm manufactures mechanical and hydraulic presses from 60 to 10,000 tons capacity and mechanical and hydraulic press brakes.

The Verson trip will cover milling, boring, drilling and planer operations on a large scale and flame cutting,

bending, straightening and fabrication of large weldments.

Besides the usual heat treatment of steels, Lindberg Steel Treating Co. now treats all types of metals. Visitors will see atmosphere treating, no longer an innovation, but a necessity to keep surfaces free of scale and to maintain dimensional stability.

Hydrogen is used for treating of stainless steels, such as might be used in jet engine parts that must be 'brite hardened'.

The 30-year-old company has grown from a two-man operation to one employing more than 300 persons. The organization is headed by L. A. Lindberg, son of the founder.

The following men have been legally nominated by petition and they should be considered along with those named in the January Nominating Committee Report as qualified candidates for national director.

Andrew B. Clark—technical consultant, for 33 years, with Haynes Stellite Co., Div. of Union Carbide & Carbon Corp., Cleveland. Senior member since 1942. Active in the affairs of Cleveland chapter. Past chairman of chapter entertainment and special events committee. Incumbent chairman chapter program committee. Past chapter secretary. Former chapter second vice chairman and incumbent first vice chairman. Chairman, host chapter meetings and arrangements committee, 1948 Tool Engineers Industrial Exposition. Former member, National Program Committee. Past secretary, National Public Relations Committee. Incumbent chairman, National Membership Committee. Attended Case Institute of Technology. Member of faculty, University of Akron. Teaching specialist for War Manpower Commission, War Production Board. Active in civic affairs and in other technical societies.

Arthur F. Murray—works manager, Electrolux Corp., Old Greenwich, Conn. Senior member since 1937 and charter member, Pittsburgh chapter. Trans-

ferred to Fairfield County chapter of 1943. Active in all chapter affairs, having served as member of Fairfield County chapter's executive group for three years. Well-known lecturer at chapter meetings and technical writer. General chairman, "Connecticut Night" committee in 1950. Member, chapter constitution and by-laws committee for three years and its incumbent chairman. Member, Army Ordnance Assoc. and the ASME. Active in other trade and civic organizations. Graduate mechanical engineer (Lehigh University).

Leslie C. Seager—chief production tool engineer, The Eimco Corp., Salt Lake City. Active in formation of Salt Lake City chapter and that chapter's charter chairman. Twenty-five years in the tool engineering field. Has held responsible positions in industry. Aided in obtaining tool engineering curriculum leading to B.S. degree at Utah State Agricultural College. Promoted first scholarships for Salt Lake City chapter in tool engineering. Active in local affairs and treasurer of Utah Engineering Council. Also active in working towards recognition of Tool Engineers professionally in Utah. Member, Institution of Production Engineers, Great Britain.

Gardner Young—supervisor, Equipment & Methods Dept., Gearing Div.,

Westinghouse Electric Corp., Pittsburgh. Senior member since 1938. Has been prominent in all chapter activities, having served as Pittsburgh chapter's treasurer, second vice chairman, first vice chairman, chairman and delegate, respectively. Member and incumbent chairman, National Program Committee. Studied general engineering and mechanics at Cottbridge Technical Institute. Active in numerous civic and technical organizations.



A. B. Clark



A. F. Murray



L. C. Seager



Gardner Young

You'll Enjoy Chicago

With its many diversified attractions, ASTE's exposition city gives the convention delegate a full schedule of activities to enjoy in an off hour from the serious business of meetings and technical sessions.

Although a full month could be spent in exploring Chicago, local color can be absorbed in a single afternoon.

Like vacations, capsule tours are best planned according to individual taste. Possibilities for your program include a casual walk through the Loop, a sight-seeing jaunt by bus, a Broadway play on tour, a leisurely dinner in a famous restaurant, or visits to the outstanding commercial and cultural centers of the Midwest.

A copy of "Headline Events in Chicago" for March, available at your hotel, will serve as a complete guide.

The Board of Trade, dominating the financial district, is Chicago's tallest building and the largest grain exchange in the world. A special gallery is open on weekdays where spectators can watch the trading. Atop the 45th floor is a glass-enclosed observation tower from which the sight-seer can look into Indiana and Wisconsin as well as the rich backlands of Illinois.

Observation towers are also located at the Wrigley Building (9:30 a.m. to 5 p.m., weekdays only) and at Tribune Tower (9-5 daily).

A city in itself, the Union Stock Yards is the most famed of world food centers. Millions of visitors annually tour the meat packing plants and laboratories that cover several square miles. Tours can be arranged at almost any hour throughout the day.

The Merchandise Mart is the largest building of its kind anywhere. Out-rivalled only by the Pentagon in Washington, D. C., it is home to thousands of wholesalers and a magnet for merchants and buyers from every section of the map. No one interested in homes should miss the Design for Living exhibit sponsored by the Museum of Modern Art.

Tours of the Mart are scheduled every half-hour from 9 to 4 on weekdays.

No schedules are necessary for visiting the informal shops and stores of the Maxwell Street Market.

Sales booths and pushcarts lend old-world atmosphere to what many call the mercantile melting pot of Chicago. Business booms every day but Saturday when all trading is at a standstill.

Below: One of Chicago's landmarks is the Shedd Aquarium, newest and most complete in the world. It contains more than 10,000 specimens, ranging from the walking fish of Africa to the colorful exhibits of deep-sea life.



Upper right: Quaint atmosphere of Down East decor characterizes the famed Cape Cod Room of the Drake Hotel. Right: More than 240 sea food delicacies are listed on the menu at the well of the Sea in the Hotel Sherman. Interior design is of an abstract under-the-ocean nature. Murals by Artist Richard Koppe are fluorescent.



Chinatown at 22 St. and Wentworth Ave. is a picturesque community with gift shops and restaurants serving authentic Cantonese food. The exotic Chinese Temple in the On Leong Merchants Association Building is open to the public from noon until 10 p.m.

One of the largest historical collections in America is housed at the Chicago Historical Museum in Lincoln Park. Closer to the Loop, world-famous paintings, prints and sculpture are on display at the Art Institute on Michigan Ave.

The Museum of Science and Industry on the lake front at 57 St. has preserved the most discussed technical exhibits of the World's Fairs of 1893 and 1933. Typical is the real coal mine which can be observed in actual operation.

Millions of visitors have seen the Shedd Aquarium, newest and most complete aquarium in the world with more than 10,000 specimens ranging from the walking fish of Africa to the colorful exhibits of deep-sea life.

The wonders of the skies are reproduced and explained for spectators at the Adler Planetarium. This institution makes study of the planets, stars and the moon, easily understood by thousands of persons each week.

The air-minded will enjoy the Midway Airport, the only one in the United States with parallel runways which permit landings and take-offs at 16 different points. A plane arrives or departs from this great industrial capital of the Midwest every three minutes.

Below: A dramatic night scene in Chicago taken from the river front. The observation tower of the Wrigley Building (right) on Michigan Ave. is open to the public from 9:30 a. m. to 5 p. m. on weekdays. Lower right: Northwestern University's Abbott Hall in downtown Chicago adds a modern note to lake front architecture.



PROGRAM

9 A.M.

Plant Tours—Buses leave Conrad Hilton Hotel for Mfg. Research Div. of International Harvester Co., Lindberg Steel Treating Co., Scully-Jones and Co., and Verson Allsteel Press Co. Buses will return plant visitors to Amphitheatre around noon.

Technical Sessions

Stockyards Inn (Adjacent to Amphitheatre)

Cooperation Between Research Centers and Engineering Societies by Dr. W. E. Mahin, Director of Research, Armour Research Foundation. Chairman: Prof. O. W. Boston, Chairman of Production Engineering Dept., University of Michigan.

The Part of Standards in Better Consumer Relations by R. E. Gay, President, Bristol Brass Co. **Relation of the Tool Engineer to Company Standards** by Dr. John Gaillard, American Standards Assoc. Chairman: R. C. Peterson, Manager, Peterson Engineering Co. **Strength of Bolted Assemblies** by John S. Davey, Assistant General Manager of Sales, Russell, Birdsall & Ward Bolt & Nut Co. Chairman: Robert Osborn, District Manager, Peninsular Steel Co.

9:30

House of Delegates Meeting
West Ballroom, Conrad Hilton Hotel

National Education Committee Meeting
Private Dining Room 12, Conrad Hilton Hotel

1:30 P.M.

Technical Session
Stockyards Inn

Criteria for Selecting Sampling Methods by Dr. J. V. Strela, Staff Statistician, Thompson Products, Inc. Chairman: D. E. Hawkinson, Sales Engineer, Greenlee Bros. & Co.

2:05 P.M.

Technical Session
Stockyards Inn

Fixed-Gage Standards and Practice by W. H. Gourlie, Standards Engineer, The Sheffield Corp. Chairman: F. J. Kampmeier, Vice President, Ingersoll Milling Machine Co.



H. F. Ruhl F. J. Kampmeier E. Y. Seborg D. E. Hawkinson



E. L. Fay G. H. Rigeman R. B. Knoth G. C. Johnson



J. T. Leyden N. G. Meagley O. W. Boston R. C. Peterson G. R. Morin

Session Chairmen, Panel Members...

Tips on selected papers: Dr. W. E. Mahin shows that cooperative research can effect definite progress in engineering. R. E. Gay believes that standards are the answer to the need for greater distribution and lower production costs. John S. Davey asserts that it is the amount of tension left in the bolt after the wrench is removed that determines the quality of the joint. John Gaillard's paper points out the need for standardization throughout the history of tooling and production. James V. Strela's paper is based on the Thompson Products sampling machine, with illustrations taken from his company's experience. Jesse Daugherty brings the subject of skin milling up to date, and includes a discussion of equipment. Jacques de Sangy is concerned primarily with the reduction of errors in measurement. John Loxham also discusses measurement devices, and includes numerous applications.

MONDAY, MARCH 17

Precision Control Day

2:50 P.M.

Technical Session Stockyards Inn

Production-Line Hardness Testing by V. E. Lysaght, Sales Manager, Wilson Mechanical Instrument Div. Chairman: H. F. Ruhl, Fairbanks, Morse & Co.

3:30 P.M.

Panel Discussion Turning and Forming Tolerances Stockyards Inn

Moderator: R. B. Knoth, Assistant Superintendent of Manufacturing Engineering, Western Electric Co., Inc.

Panel Speakers: Robert Eckholm, Chief Inspector, Illinois Tool Works; E. L. Fay, Quality Control Manager, Deere & Co.; J. T. Leyden, Service Engineer, Crucible Steel Co. of America; N. G. Meagley, Manager, Statistical Quality Control, Willys-Overland Motors, Inc.; G. R. Morin, Chief Sales Engineer, Jones & Lamson Machine Co.; and D. J. Williams, President, Connecticut Tool & Engineering Co.

8 P.M.

Technical Sessions North Ballroom, Conrad Hilton Hotel

Contour Milling of Sheet Stock by Jesse Daugherty, Consultant, Giddings & Lewis Machine Tool Co. Chairman: E. Y. Seborg, Barnes Drill Co.

Red Lacquer Room, Palmer House

Control of Quality on Mass Produced Engineering Parts by John Loxham, Managing Director, Sigma Instrument Co., Ltd. Chairman: G. H. Rigeman, George D. Roper Corp.

Normandie Lounge, Conrad Hilton Hotel

Improved Measurement as a Way Towards Safer Tolerances by Jacques de Sangy, Sales Director, Societe Genevoise d'Instruments de Physique. Chairman: G. C. Johnson, W. F. and John Barnes Co.

Exposition exhibits at the International Amphitheatre will open from 9 A.M. to 6 P.M. No one can be admitted after 5 P.M.

Technical Speakers . . .

V. E. Lysaght has been active in the development of microhardness testing since 1940. Author of the text book, *Indentation Hardness Testing*, he has lectured before various chapters of ASTE and ASM. . . J. V. Strela holds a Ph. D. in sociology and statistics from Charles University of Prague. He is the originator and administrator of various training programs in quality control. Jacques de Sangy lived for many years in Switzerland, took his degree at the engineering school in Zurich in 1930. Before entering the machine tool industry, he was associated for several years with a manufacturer of turbines and electrical equipment. . . Jesse Daugherty has been associated with the tool engineering field for more than 25 years. He was made a consultant on planer type machine tools in 1951. . . Shortly after graduation from college, R. E. Gay entered the brass industry in 1926; was elected president of Bristol Brass in 1943. A member of the WPB advisory committee on copper and brass during World War II, he currently is a member of the brass mill industry advisory committee. Mr. Gay is president of the American Standards Association and a director of the National Association of Manufacturers. . . John Loxham's background in manufacturing includes seven years as head of the engineering production department of Northampton Polytechnic, London. As managing director of the Sigma Instrument Co., his responsibility includes design and development of new inspection techniques and associated inspection equipment. . . John Gaillard was for two years associate director of the Netherlands Standards Association, was associated with the late Frank B. Gilbreth after his emigration to the United States in 1923. In addition to his ASA activities, Dr. Gaillard has since 1947 given a course on standardization at Columbia University.



V. E. Lysaght

J. V. Strela



Jacques de Sangy

Jesse Daugherty

R. E. Gay



John Loxham

John Gaillard

W. H. Gourlie

PROGRAM

9 A.M.

Plant Tours—Buses leave Conrad Hilton Hotel for Aircraft Engine Div., Ford Motor Co.; Clearing Machine Co.; Electromotive Div., General Motors Corp.; Kropp Forge Co.; Lindberg Steel Treating Co.; Motorola, Inc.; and Scully-Jones and Co.; Sherwin-Williams Co. Buses will return plant visitors to Amphitheatre around noon.

Technical Sessions

Stockyards Inn (Adjacent to Amphitheatre)

Complete Deep Hole Production from Trepanning to Final Finish by J. S. Ladendorf, Deputy Director, Wohlfahrt Engineering and Manufacturing Co. Chairman: Vitas Thomas, President, Tomco Products.

Broaching of Internal Gears by J. A. Psenka, Engineer, National Broach & Machine Co. Chairman: F. T. Wruk, Executive Vice President, Peerless Machine Co.

Electromechanical Machining of Hard Materials by M. F. Judkins, Chief Engineer, Carbide Div., Firth-Sterling Steel & Carbide Corp. Chairman: W. N. Reinhardt, Assistant Superintendent, Racine Tool and Machine Co.

1:30 P.M.

Technical Session

Stockyards Inn

Speed and Feed Selection for Efficient Drilling by C. J. Oxford, Chief Engineer, National Twist Drill & Tool Co. Chairman: W. C. Davidson, Tool Engineer, Modine Mfg Co.

2:05 P.M.

Technical Session

Stockyards Inn

Precision Hole Locating Methods by F. C. Victory, Chief Engineer, Moore Special Tool Co. Chairman: G. S. Strambeck, Education Coordinator, Racine Vocational School.

2:50 P.M.

Technical Session

Stockyards Inn

Drill Jig Design for Secondary Operations by J. I. Karash, Process Engineer, Reliance Electric & Engineering Co. Chairman: G. F. Tigges, Tool Engineer, Modine Mfg. Co.



G. F. Tigges

O. H. Arndt

Vitas Thomas

G. S. Strambeck

E. Von Hambach



J. Y. Riedel

G. W. Christiansen

W. N. Reinhardt

F. T. Wruk

E. A. Brezina



W. C. Davidson

R. A. Schafer

R. T. Jones

B. D. Smith

C. C. Waldo

Chairmen and Panel Members...

Tips on selected papers: J. A. Psenka considers five points in gear broaching: involute form, lead, spacing, size and eccentricity. C. J. Oxford's paper includes evaluations of drill torque made at various speeds and feeds. F. C. Victory recommends standardizing certain practices on the jig borer and jig grinder for best results. J. I. Karash discusses various alternatives of performing secondary operations while the part is still in the drill jig. Effects of velocity, energy and area of contact of the cutting edge are included in K. R. Blake's paper, in addition to a discussion of the function of carbon tetrachloride as a machining fluid. A method of evaluating the machinability of metals is described.

TUESDAY, MARCH 18

Metal Cutting Day

3:30 P.M.

Panel Discussion: Drilling Stockyards Inn

Moderator: C. C. Waldo, Assistant Master Mechanic, Electromotive Div., General Motors Corp.

Panel Speakers: M. S. Aljanich, Superintendent of Tool Cribs, Caterpillar Tractor Co.; E. A. Brezina, in charge of Production Design and Application, The Cleveland Twist Drill Co.; J. Y. Riedel, Tool Steel Engineer, Bethlehem Steel Co.; R. A. Schafer, Chief Development Engineer, National Automatic Tool Co.; B. D. Smith, General Supervisor, Mechanical Engineering Research, International Harvester Co.; and E. Von Hambach, Research and Development Engineer, The Carpenter Steel Co.

Exposition exhibits at the International Amphitheatre will be open from 9 A.M. to 6 P.M. No one can be admitted after 5 P.M.

8 P.M.

Technical Sessions

Normandie Lounge, Conrad Hilton Hotel

Recent Advances in Metal Cutting Science and Practice by Hans Ernst, Research Director, and Dr. M. E. Merchant, Senior Research Physicist, Cincinnati Milling Machine Co. Chairman: O. H. Arndt, Tractor Engineering Dept., Massey-Harris Co.

North Ballroom, Conrad Hilton Hotel

New Developments in Cemented Carbides by J. S. Gillespie, Manager of Product Sales, and I. L. Wallace, Manager of Engineering, Carboly Dept. of General Electric Co. Chairman: R. T. Jones, Assistant Chief Tool Engineer, Walker Mfg. Co.

Red Lacquer Room, Palmer House

Dynatronics—A New Concept in Metal Removal by Kenneth R. Blake, Consulting Physicist and Vice President, Metalloid Corp. Chairman: G. W. Christiansen, Assistant Sales Manager, Racine Tool and Machine Co.

Technical Speakers...

J. S. Gillespie joined Carboly Co. in 1936 and was responsible for development of the Carboly customer training course in 1940. Eugene Merchant has been with Cincinnati's research department since receiving his Sc. D. in 1941. He has published numerous technical papers and is co-author with Hans Ernst of the section on metal cutting and machinability of the *Tool Engineers Handbook*. Mr. Ernst has been in charge of research and development at the Cincinnati Milling Machine Co. for the past 25 years as director of research. . . I. L. Wallace assumed charge of GE's Carboly department at the Cleveland Wire Works in 1938, and was responsible for the production of Carboly cemented carbide blanks and powders. Mr. Wallace later became director of metal manufacturing operations, until his promotion to manager of engineering in 1950. . . Carl J. Oxford, in addition to his work with various engineering societies, is active on several committees of the Metal Cutting Tool Institute. . . Joseph A. Psenka is a graduate of General Motors Institute and of the University of Michigan; joined Buick Motor Co. in 1934 as a student engineer. . . Malcolm F. Judkins has appeared before numerous ASTE groups lecturing on carbide problems. He has had extensive experience in carbide shell tooling and, in addition to his present work, is chief engineer of Firth Sterling's high temperature alloys division. . . K. R. Blake has spent the past two decades in research and development work, concentrating for the last ten years on studies of the basic physics of metal removal. . . J. I. Karash has authored many articles on various tool engineering subjects during his 23 years in production work. Mr. Karash was general chairman of the Cleveland show committee during the 1948 ASTE Exposition.



J. S. Gillespie



M. E. Merchant



I. L. Wallace



C. J. Oxford



J. A. Psenka



M. F. Judkins



Hans Ernst



K. R. Blake



J. I. Karash

PROGRAM

9 A.M.

Plant Tours—Buses leave Conrad Hilton Hotel for Aircraft Engine Div. of Ford Motor Co.; Clearing Machine Co.; Electromotive Div. of General Motors Corp.; Melrose Park Plant of International Harvester Co.; Kropp Forge Co.; Scully-Jones and Co.; Thor Corp.; United States Steel Corp.; and Western Electric Co. Buses will return plant visitors to Amphitheatre around noon.

Technical Sessions

Stockyards Inn (Adjacent to Amphitheatre)

Tool Engineers and Electroforming by Dr. C. L. Faust, Head, Electromechanical Engineering Div., Battelle Memorial Institute. Chairman: H. M. Chambers, Tool Engineer, International Vermiculite Co.

Multiple Screw Machine Tooling and Methods by C. R. Morgan, Consulting Engineer, Cone Automatic Machine Co. Chairman: R. W. Wallace, Technical Superintendent, Sangamo Electric Co.

Aptitude Tests Aid Production Personnel by Dr. J. E. King, Director, Industrial Psychology, Inc. Chairman: Prof. J. N. Edmondson, Production Div., Industrial Engineering, Ohio State University.

1:30 P.M.

Technical Session

Stockyards Inn

Die Design for Metal Blanking by R. C. Berliner, Owner, C. B. Cash Mfg. Co. Chairman: R. E. Bodendoerfer, Purchasing Agent, J. M. Nash Co.

2:05 P.M.

Technical Session

Stockyards Inn

Die Design for Metal Drawing by C. R. Cory, Engineer in Charge of Die Engineering, Fisher Body Div., General Motors Corp. Chairman: C. E. Miller, Sales Engineer, Schlitt Industrial Supply Co.

2:50 P.M.

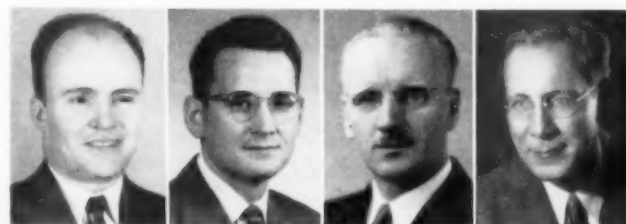
Technical Session

Stockyards Inn

Selection and Treatment of Die Steels by Dr. S. G. Fletcher, Chief Metallurgist, Latrobe Electric Steel Co. Chairman: E. J. Kane, Chief Tool Designer, Sangamo Electric Co.



E. J. Reitter R. E. Bodendoerfer R. W. Wallace Vasil Georgeff



E. J. Kane Ralph Weisbeck S. H. Ericson Walter Gulliksen



H. G. Heimann R. W. Lund P. F. Rehner H. M. Chambers J. N. Edmondson

Session Chairmen, Panel Members...

Tips on selected papers: C. L. Faust points out that electroforming now offers not only an inexpensive method of production, but in addition a method of reproducing precise dimensions. C. R. Morgan considers equipment, tool design, accessories, inspection, speeds and lubricants in developing maximum efficiency from multiple spindle operations. Joseph E. King's paper asserts that aptitudes for specific jobs in industry can be ascertained, and further that the presence or lack of these aptitudes in personnel can be tested and measured. Research studies indicate

24 major job areas, and eight basic aptitudes. Charles R. Cory defines a successful draw as lying in that region between the extremes of not stretching the metal enough to prevent the formation of wrinkles, and stretching the metal so much as to exceed the yield point. In S. G. Fletcher's paper the fundamental properties of tool steels are considered on the basis of their AISI classification.

WEDNESDAY, MARCH 19

Materials Forming Day

3:30 P.M.

Panel Discussion Metal Stamping Dies and Operations

Stockyards Inn

Moderator: S. H. Ericson, Chief Tool Engineer, American Flange & Mfg. Co., Inc.

Panel Speakers: Vasil Georgeff, Chief Engineer, Danly Machine Specialties, Inc.; Walter Gulliksen, Superintendent, Worcester Pressed Steel Co., (representing Pressed Metal Institute); H. F. Jahn, President, B. Jahn Mfg. Co., (representing National Tool & Die Mfrs. Assoc.); P. F. Rehner, Manager of Sales, Carbide Div., Allegheny-Ludlum Steel Corp.; E. J. Reitler, Sales Engineer, Firth Sterling Steel & Carbide Corp.; and Ralph Weisbeck, Chief Engineer, Wales-Strippit Corp.

Exposition exhibits at the International Amphitheatre will be open from 9 A.M. to 6 P.M. No one can be admitted after 5 P.M.

8 P.M.

Technical Sessions Red Lacquer Room, Palmer House

Machining and Heat-Treatment of Boron Steels by J. D. Graham, Works Metallurgist, Farm Tractor Div., International Harvester Co. Chairman: H. G. Heimann, Industrial Engineer, Cleaver Brooks Co.

North Ballroom, Conrad Hilton Hotel

Sand Casting with Croning Process Shell Molds by Richard Herold, Manager, Foundry Products Dept., Chemicals Div., The Borden Co. Chairman: R. W. Lund, Sales Engineer, Sterling Grinding Wheel Div.

Normandie Lounge, Conrad Hilton Hotel

New Precision Roughness Specimens for Surface Finish Control by Dr. C. R. Lewis, Staff Engineer, Chrysler Corp., and A. F. Underwood, Head, Technical Engineering Dept. 5, Research Laboratories Div., General Motors Corp. The Surfagage—An Instrument for Roughness Measurement by Mr. Underwood, J. B. Bidwell, Assistant Head, and J. H. Brems, Research Engineer, Technical Engineering Dept. 5, Research Laboratories Div., General Motors Corp. Chairman: O. A. Woodcock, Chief Engineer, John W. Hobbs Corp.

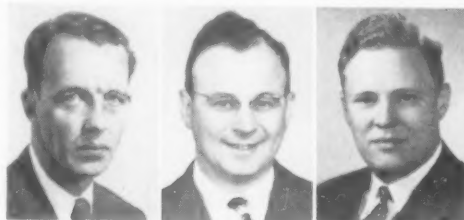
Technical Speakers . . .

J. D. Graham has been in metallurgical work with the International Harvester Co. since 1935. He has been works metallurgist of the Louisville Works since 1946. . . **C. L. Faust** has a wide interest in engineering and research activities in the electrochemical field, including participation in several technical societies. During his association with Battelle Institute since 1934, he has authored numerous technical articles and is the holder of many patents in these fields. . . **Joseph E. King** combines his practice in industrial psychology with the directorship of a non-profit foundation to carry out basic and applied research in personnel and other fields of applied psychology. . . **R. C. Berliner**, in addition to his tool engineering experience since 1932, was an instructor in die design at the Illinois Institute of Technology for ten years. . . **Stewart G. Fletcher** completed a three-year research program on the problem of dimensional stability of metals at Massachusetts Institute of Technology under sponsorship of Sheffield Foundation. He has appeared frequently before various ASTE groups. . . **C. R. Morgan** has completed 45 years in the screw machine field including 25 years as superintendent of the screw machine department of the Pittsfield Works of General Electric Co. . . **Charles R. Cory** has produced two books and a number of technical articles on various phases of die design. He has been associated with die engineering activity at Fisher Body for 23 years. His interests have included lecturing on die engineering at the University of Detroit. . . **Richard Herold** has devoted the past several years to the study of synthetic resins for foundry and shell molding applications.



J. D. Graham

C. L. Faust



J. E. King

R. C. Berliner

S. G. Fletcher



C. R. Morgan

C. R. Cory

Richard Herold

PROGRAM

9 A.M.

Plant Tours—Buses leave Conrad Hilton Hotel for Clearing Machine Co., Mfg. Research Div. of International Harvester Co., Melrose Park Plant of International Harvester Co., Kropp Forge Co., Lindberg Steel Treating Co., Motorola, Inc., Scully-Jones and Co.; Sherwin-Williams Co. and Verson Allsteel Press Co. Buses will return plant visitors to Amphitheatre around noon.

Technical Sessions

Stockyards Inn (Adjacent to Amphitheatre)

The Functions of Cutting Fluids in Modern High Speed Machining by Harry A. Erickson, Director of Engineering, Stuart Oil Co., Ltd. Chairman: D. H. Brighton, Staff Engineer, Planning Dept., Caterpillar Tractor Co.

Production Grinding of Cylindrical Parts Requiring Extreme Precision by James Meehan, Sales Div., and A. E. Mandeville, Application Engineer, Brown & Sharpe Mfg. Co. Chairman: R. W. Bayless, Supervisor, Education and Training Dept., Caterpillar Tractor Co.

Cupola Deoxidation Improves Machinability of Iron Castings by F. S. Kleeman, Consulting Engineer. Chairman: D. I. Hartter, Scheduling Manager, Caterpillar Tractor Co.

12:30 P.M.

Past President's Luncheon
Conrad Hilton Hotel

1:30 P.M.

Technical Session
Stockyards Inn

Automatic Size Control in Finish Grinding by W. E. Moody, Sales Engineer, and R. A. Green, Abrasive Engineer, Bay State Abrasive Products, Inc. Chairman: J. O. Knight, Factory Manager, L. R. Nelson Mfg. Co., Inc.

2:05 P.M.

Technical Session
Stockyards Inn

Precision Production Grinding by B. H. Work, Assistant Sales Manager, Bonded Products & Grain Div., The Carborundum Co. Chairman: W. H. Logue, Staff Engineer, Planning Dept., Caterpillar Tractor Co.



J. O. Knight

R. N. Bell

R. W. Bayless



D. I. Hartter

J. A. Harrington

W. H. Logue

Adam Gabriel



C. T. Rideout

Gordon Swardenski

M. L. Bengtson

D. H. Brighton

Session Chairmen and Panel Members . . .

Tips on selected papers: Harry A. Erickson discusses the mechanics of chip formation and recent studies on the behavior of metals at the high temperatures and high rates of deformation associated with high-speed machining. The paper by Meehan and Mandeville is devoted to the problem of grinding cylindrical parts, on centers, to extreme precision and high surface quality. Machine alignment is also considered, as it affects grinding accuracy. F. S. Kleeman states that the most important factor in improving machinability of grey iron through structure control is the prevention of segregations of graphite, cementite and steadite. He describes a deoxidation treatment aimed at accomplishing this. Robert A. Green defines size control, discusses the types of grinders to which size control is applicable as well as the limitations of the control. Slides will illustrate some of the various control devices. A. W. Todd's paper deals with the more common errors that develop in the grinding of cylindrical surfaces, and outlines some of the techniques which have resulted in improved machine performance, better finishes and higher production.

THURSDAY, MARCH 20

Grinding and Finishing Day

2:50 P.M.

Technical Session
Stockyards Inn

Finish Grinding Troubles and Remedies
by A. W. Todd, Assistant Chief Engineer, Van Norman Co. Chairman: Gordon Swardenski, Planning and Tooling Manager, Caterpillar Tractor Co.

3:30 P.M.

Panel Discussion: Finish Grinding
Stockyards Inn

Moderator: M. L. Bengtson, Vice President, Mercury Engineering Co.

Panel Speakers: R. N. Bell, Technical Engineer, Hammond Machinery Builders, Inc.; R. A. Cole, Vice President, Production Machine Co.; Adam Gabriel, President, Acme Industrial Co.; J. A. Harrington, Chief Engineer, The DoAll Co.; C. M. Lamabe, Master Mechanic, Chevrolet-Toledo Div. of General Motors Corp.; and G. T. Rideout, Sales Engineer, Norton Co.

8 P.M.

20th Annual Banquet and Membership Meeting
(Informal)

Grand Ballroom, Conrad Hilton Hotel

Speaker
Charles E. Wilson
Director of Defense Mobilization

Exposition exhibits at the International Amphitheatre will be open from 9 A.M. to 6 P.M. No one can be admitted after 5 P.M.

Speakers in Today's Sessions . . .

A. W. Todd, with the Van Norman Co. for 15 years, has specialized in machine and tool design of milling and grinding machines and was instrumental in the development of the Van Norman production grinding machines. . . **James Meehan** joined Brown and Sharpe in 1917 as an apprentice. During the thirties, he did extensive survey work on machine tools in Europe. . . **F. S. Kleeman** holds degrees in mechanical and metallurgical engineering and is presently engaged as a consulting engineer in the iron and steel industry. He holds a number of patents in the fields of steel metallurgy and foundry practice. . . **Boyd H. Work's** experience in abrasives, grinding wheels and grinding practice goes back to 1916 when he joined the Carborundum Co. His work has included organic research, production supervision and product development. He has extensive engineering society affiliations. . . **Harry A. Erickson** was for many years chief engineer of the D. A. Stewart Oil Co. before assuming his present position as director of engineering. Early professional experience introduced Mr. Erickson to the problems of metal cutting and he has had an active interest in the mechanisms of metal cutting and lubrication. . . **A. E. Mandeville**, who joined Brown and Sharpe in 1913, has been associated for many years with the introduction of modern grinding processes and techniques. His extensive experience in engineering foreign installations led to his return to France in the late thirties during the tooling at the Hispano-Suiza aircraft engine plant.



C. E. Wilson

A. W. Todd



James Meehan

F. S. Kleeman

B. H. Work



H. A. Erickson

R. A. Green

A. E. Mandeville

PROGRAM

9 A.M.

Plant Tours—Buses leave Conrad Hilton Hotel for Clearing Machine Co.; Mfg. Research Div. of International Harvester Co.; Melrose Park Plant of International Harvester Co.; Aircraft Engine Div. of Ford Motor Co.; Lindberg Steel Treating Co.; Scully-Jones and Co.; Thor Corp. and Verson Allsteel Press Co. Buses will return plant visitors to Amphitheatre around noon.

Technical Sessions

Stockyards Inn (Adjacent to Amphitheatre)

Analysis of Cost Estimating Principles and Practices by L. E. Doyle, Associate Prof. of Mechanical Engineering, University of Illinois. Chairman: R. E. Beebe, General Manager, Winkelmann Co.

Power Chucking by H. L. Stewart, Assistant Sales Manager, Logansport Machine Co. Chairman: G. M. Waller, Chief Engineer, Burgess Norton Mfg. Co.

Practical Aspects of Tool and Die Heat Treatment by E. J. Pavesic, Research Director, Lindberg Steel Treating Co.

Chairman: S. R. Cope, President, Acme School of Design Engineering.

1:30 P.M.

Technical Session

Stockyards Inn

Electronics in Motor Drives by E. H. Vedder, Manager, Industrial Electronics Control Engineering, Westinghouse Electric Corp. Chairman: J. C. Yoder, Foreman, Martin Machine Co., Inc.

2:05 P.M.

Technical Session

Stockyards Inn

Principles for Selecting Pneumatic vs. Hydraulic Drives by J. C. Hanna, Vice President and Chief Engineer, Hanna Engineering Works. Chairman: B. J. Phillips, Owner, Phillips Auto Parts.

2:50 P.M.

Technical Session

Stockyards Inn

Mechanical Variable Speed Drives by H. G. Keller, Assistant Chief Engineer, Link-Belt Co. Chairman: H. J. Braun, Sales Engineer, Foote Bros. Gear & Machine Co.

3:30 P.M.

Panel Discussion

Machine Drives and Controls

Stockyards Inn

Moderator: R. O. Knudson, Special Machine Tool Dept., Greenlee Bros. & Co.

Panel Speakers: K. H. Casson, Chief Engineer, Barnes Drill Co.; D. B. Enyeart, Design Engineer, The Monarch Machine Tool Co.; O. J. Maha, Vice President and Chief Engineer, Hannifin Corp.; R. W. Pashby, Assistant to Vice President, in charge of Engineering and Research, Micro Switch Div.; R. J. Owen, Chief Application Engineer, The Louis Allis Co.; B. S. Nelson, Chief Engineer, Foote Bros. Gear & Machine Corp.



R. E. Beebe

S. R. Cope

R. W. Pashby



D. B. Enyeart

B. S. Nelson

J. C. Yoder

R. O. Knudson

Session Chairmen and Panel Members . . .

Tips on selected papers: L. E. Doyle considers the individual cost elements of a project, evaluates them by comparisons with past performance, or calculations based upon prices and cost rates. H. L. Stewart's paper outlines the two classes of power chucks—wrench and drawbar—and concentrates on the latter. Actual cost figures are presented on the percentages of savings in power chucking time over hand chucking time. E. J. Pavesic considers the correlation between the tool design and the type of tool steel, and the effects of this correlation on heat treatment. The importance of proper study in the design stage is stressed. H. G. Keller evaluates limitations and performance of variable drives and their controls.

FRIDAY, MARCH 21

Machine Accessories, Drives and Control Day



J. J. Demuth
President



G. A. Goodwin



F. J. Schmitt



Harry Conrad
Executive Secretary



Frank Wilson
Technical Director



Gardner Young
Chairman, NPC



J. O. Horne
Member, NPC



T. C. Barber
Member, NPC



K. W. Riddle
Member, NPC



C. J. Helton
Member, NPC

Members of ASTE's National Program and Exposition Committees

Technical Speakers . . .

Henry G. Keller has had wide experience in the design, development and application of power transmission machinery. At present he is connected with special machinery requirements. L. E. Doyle entered the teaching profession with a background of 15 years in industry. A registered professional engineer, he has published a number of technical articles as well as a text on tool engineering. . . H. L. Stewart spent several years in research and development for Logansport Machine Co. before being assigned special engineering responsibilities in 1947. He has appeared before many of ASTE's chapters as well as those of other engineering societies. . . E. J. Pavesic assisted, during his seven years with Republic Steel's metallurgical department, in the development of the S-A-C hardenability test for carbon steels. . . Much of J. C. Hanna's interest has been devoted to the application of fluid mechanics to such machine design as riveters, foundry equipment, cylinders and valves. . . E. H. Vedder's experience with Westinghouse has included electronic control and resistance welding engineering.



H. G. Keller



L. E. Doyle



H. L. Stewart



E. J. Pavesic



J. C. Hanna



E. H. Vedder



H. Dale Long
Chairman



M. A. Blu
Co-Chairman



A. L. Winkler
Secretary



A. H. Ettinger
Social Program



W. W. Haskins
Reception



Fred Rust
Plant Tours



Robert Osborn
Plant Tours



Mrs. Marian Miller
Ladies Activities



Clare Bryan
Signs



Harry Paine
Session
Arrangements



H. H. Katz
Education Exhibits



A. J. Schwister
Technical Sessions



B. A. Fluery, Jr.
Technical Sessions



G. J. Benes
Supplementary
Functions



H. V. Leopert
Emergencies



Joseph Early
Transportation



E. K. Dayne
Registration



E. W. Dickett
Tickets



A. W. Blackshaw
Publicity



J. H. Beck
Budget

Chicago Chapter Show Committee

1952 Annual Meeting
and Exposition

F. A. Armstrong, entertainment; J. J. Kayda, records and reports; R. W. Miller, banquet; F. J. Schmidt, housing

Ladies Activities

Chicago's showcase of well-known places to see and interesting things to do will be opened wide for ASTE wives attending the 20th Annual Meeting and Exposition.

Day by day, the program provides visitors with a balance of sight-seeing, tours of cultural centers, a fashion show, radio and television programs, plus time set aside for more relaxed sociability.

Responsibility for organizing and scheduling these activities has been shouldered by a special exposition committee headed by Mrs. Marian Miller.

Plans for Monday morning include a tour of the world's largest hotel, the Conrad Hilton. That

afternoon America's second largest collection of masterpieces will be viewed at the Art Institute.

Buses of the Gray line will take the Chicago visitors on a sight-seeing tour Tuesday. Also scheduled is the Museum of Science and Industry.

Luncheon at Marshall Field's Wedgewood Room on Wednesday will be highlighted by a fashion show. A flexible afternoon program will take ASTE wives behind the scenes at the Marshall Field store or, if they prefer, to the Chicago Historical Society in Lincoln Park.

Tickets have been secured for Thursday's broadcast of Don McNeill's Breakfast Club. Later in the day a tour of the Design for Living exhibit, showing the latest in home interiors, is scheduled at the Merchandise Mart.

A side trip has been arranged Friday to the Little Traveler shop and the Haeger Potteries at Geneva, about 35 miles from Chicago. Other tours are set for the Chicago Natural History Museum and the Shedd Aquarium.

Definite schedules, information on supplementary activities and tickets for radio and television broadcasts will be available at registration desks set up at the Conrad Hilton Hotel, the Palmer House and at the Amphitheatre.

Below: Don McNeill (center, front row) and his radio cast will be hosts to ASTE visitors at the Breakfast Club program. The fashion salon (right) at Marshall Field and Company will be included on a tour of one of the world's largest department stores. The Art Institute is shown at the lower right.



Restaurant Guide



Good food is an important part of a convention and Chicago provides its visitors with the best. A guide to restaurants and supper clubs follows with special emphasis placed on the unusual and more well-known places.

Expensive But Worth It

Buttery, Ambassador West Hotel, N. State and E. Goethe St. Fine atmosphere and fine food. Music (except Monday) starts at 9.

Camellia House, Drake Hotel. A beautiful spot to dine and dance.

Don, the Beachcomber, 101 E. Walton Place. Serves Cantonese food that's hard to beat.

Kungsholm, 100 E. Ontario (near Loop). Beautiful setting in a famous old mansion. Smorgasbord and Scandinavian foods you'll talk about for a long time.

L'Aiglon, 22 E. Ontario. Fine French restaurant where many Chicagoans like to dine.

Pump Room, Ambassador East Hotel. Swank spot where celebrities meet. Order a flaming sword dinner, but first make reservations.

St. Hubert's Old English Grill, 316 S. Federal St. (Loop). Choice English mutton chops a specialty. Delicious steaks too, served in simple, pleasant surroundings.

Not So Expensive

Blackhawk Restaurant, 139 N. Wabash. (Loop). A popular dine and dance spot with a revue.

Mann's Rainbo Restaurant, 73 E. Lake St. (Loop). If it swims, they have it.

Swiss Chalet, Bismarck Hotel (Loop). Serves Swiss and German specialties. Dancing and entertainment nightly.

If It's Steak You Want

College Inn Porterhouse, Hotel Sherman. Features "A Steak for Every Purse".

Ray's Steak House, 112 E. Illinois (near Loop). They broil them to perfection here.

Sirloin Room, Stockyards Inn. Next door to the Amphitheatre. Select the steak of your choice at this outstanding restaurant.

Fish and Sea Food

Cape Cod Room, Drake Hotel. It's one of the very best spots in town. Fresh Colorado brook trout flown in daily.

Ireland's, 632 N. Clark St. Features anything you may wish in the sea food line.

Well of the Sea, Hotel Sherman. Prices above average but for sea food at its finest, this is it.

American Restaurants

Charles Harrison Restaurant, One N. La Salle St. One of the better Loop restaurants. You'll be pleased with the prices too.

Eitel's Field Building Restaurant, 130 S. Clark. Good for lunch and early dinner. In the Loop.

Isbell's, 940 N. Rush St. Chicken, ribs and charcoal steaks their specialty. Open every day until 3 a.m.

Wrigley Building Restaurant, 410 N. Michigan Ave. Just five minutes from the Amphitheatre.

International Restaurants

Allegretti's Grill, 359 N. Wells St. (Loop). Italian cooking you will like. Steaks and chops too, if you prefer.

Bit of Sweden, 1015 N. Rush St. Smorgasbord is a delightfully quiet atmosphere.

House of Eng, 106 E. Walton Place. Chinese food at prices that are not too high.

Jacques' French Restaurant, 900 N. Michigan Ave. Expensive but right up there with the best of them. Reservations advisable.

Old Heidelberg, 14 W. Randolph. Attractive dining room, classical music and fine German food.

Red Starr Inn, 1538 N. Clark St. Tops for German cooking.

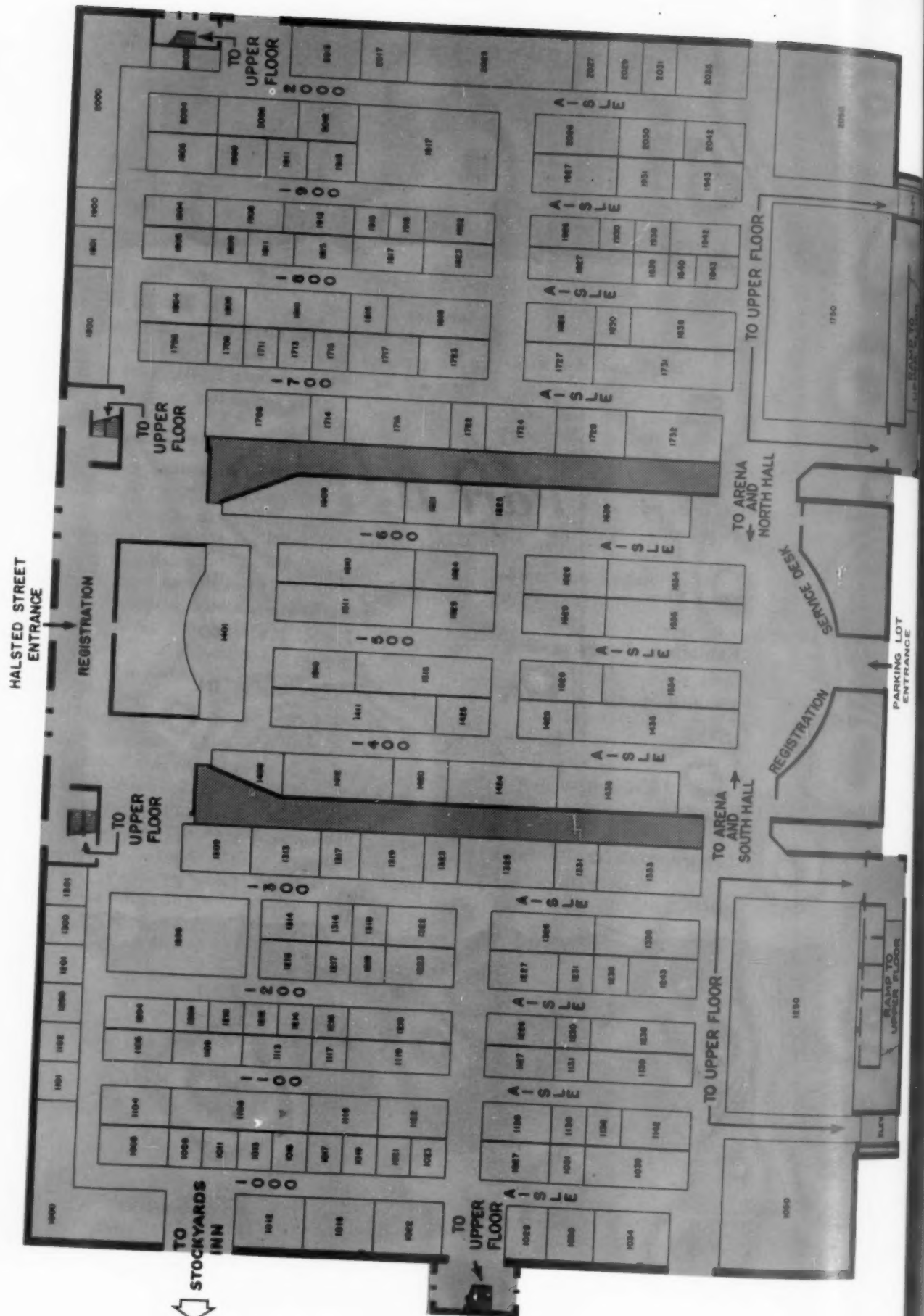
Riccardo's Studio Restaurant, 437 N. Rush St. Popular after-theatre spot for Italian food.

Shangri-La, 222 N. State St. One of the best Chinese spots—expensive. You'll see some of the most unusual and tempting food.

Sweden House, 157 E. Ohio St. Swedish dishes you are sure to like.

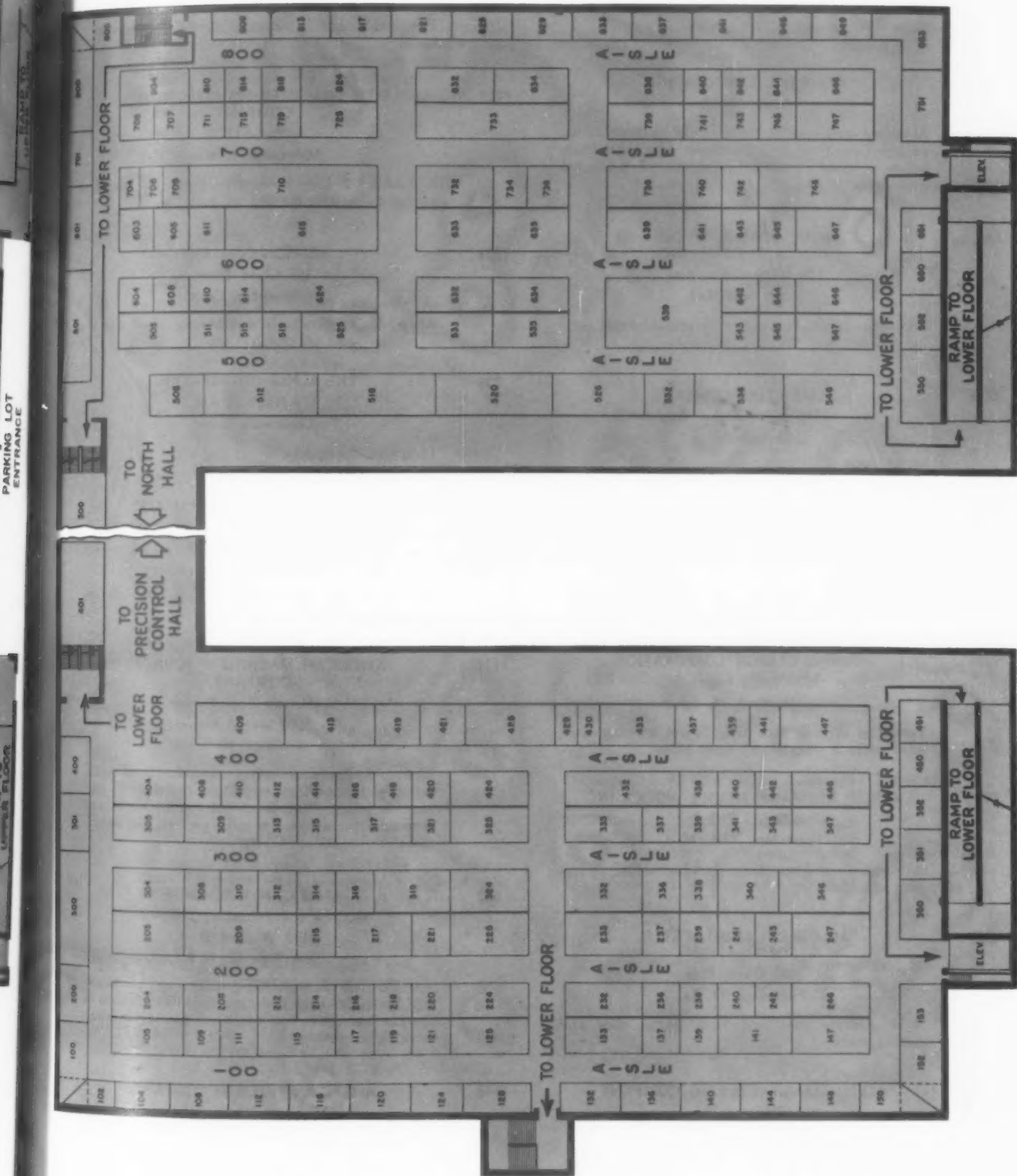
Part II

Floor Plan	58
Exhibitors, Products	60
Products Index	84



Floor Plan:

Chicago International Amphitheatre



Exhibitors, Products . . .

Booth No.

838

ACCURATE BUSHING COMPANY

443 North Ave.
Garwood, N. J.

Drill jig bushings, piercing punches

144

ACE DRILL CORPORATION

Adrian, Mich.

Standard and special drills, solid carbide drills, carbide-tipped drills, knockout pins, punches, reamers, blanks and long lengths of hardened high-speed steel

644

ACME SCHOOL OF DIE DESIGN ENGINEERING

129 West Colfax Ave.
South Bend, Ind.

Complete curriculum and also printed texts used for training tool and die designers

1226

ACME STEEL COMPANY

2840 South Archer Ave.
Chicago 8, Ill.

Metal stitchers

128

ACME TOOL COMPANY

71 West Broadway
New York 7, N. Y.

Surface plates, parallels, universal right angles, toolmakers knee, tool holders and bits

1301

ADAMAS CARBIDE CORPORATION

1000 South Fourth St.
Harrison, N. J.

Tungsten carbide tool tips; wire drawing dies, solid carbide inserts and wear parts

1715

ALFRED HOFMANN NEEDLE WORKS, INC.

629-635 59th St.
West New York, N. J.

Automatic screw machines; tool grinding & lap-ping machines

1218

ALLEGHENY LUDLUM STEEL CORPORATION

2020 Oliver Bldg.
Pittsburgh 22, Pa.

Steel-carbide dies and wear parts; dies and cutting tools

116

ALLEN MANUFACTURING COMPANY

Drawer 570
Hartford 2, Conn.

Set screws, socket head cap screws, pipe plugs, shoulder screws, flat head cap screws, dowel pins, hex keys and allenuts.

Booth No.

225

ALLIED PRODUCTS CORPORATION

12677 Burt Rd.
Detroit 23, Mich.

Punches and die buttons; clinch nut insertion tools.

1728

ALLIS-CHALMERS MANUFACTURING COMPANY

Box 512
Milwaukee 1, Wis.

Standard 10-kw dielectric heater, manually operated for the brazing of tool tips

1204

ALLISON COMPANY

257 Island Brook
Bridgeport 8, Conn.

Abrasive cutting wheels, saw blades, cut-off wheels.

706

THE ALPHA CORPORATION

179 Hamilton Ave.
Greenwich, Conn.

Industrial lubricants

825

AMERICAN CYSTOSCOPE MAKERS, INC.

1237 Lafayette Ave.
New York, N. Y.

Borescopes for visual inspection of relatively inaccessible surfaces

1131

AMERICAN MACHINE & FOUNDRY COMPANY

Wahlstrom Tool Division
5502 Second Ave.
Brooklyn, N. Y.

Float-lock universal safety vises for band saws, drill presses, milling machines, radial drills and work benches. Wahlstrom automatic chucks and tapping attachments for drill presses, jig borers, radial drills and polishing lathes

632

AMERICAN MACHINIST

McGraw Hill Publishing Company
330 W 42nd St.
New York 18, N. Y.

AMERICAN MACHINIST magazine; McGraw-Hill Book Company technical books on subjects of specific interest to tool engineers and other metal working executives

1943

AMERICAN PULLMAX COMPANY

2637 North Western Ave.
Chicago 47, Ill.

Sheet metal and plate working machines, wire straightening and cutting machines, portable flame cutting equipment

Booth No.

1917

AMERICAN SIP CORPORATION

100 East 42nd St.

New York 17, N. Y.

Precision jig borers, accessories, attachments; hydroptic drilling, boring, milling, measuring machines; linear milling, drilling machines, optical tables; shop gage and universal measuring instruments; profile projectors, metrological apparatus

500

AMERICAN SOCIETY OF TOOL ENGINEERS

10700 Puritan Ave.

Detroit 21, Mich.

Society membership & industry services

1215

AMERICAN WHEELABRATOR AND EQUIPMENT CORPORATION

451 South Byrkit St.

Mishawaka, Ind.

Wet blast cabinet; shot peening methods; airless blast cleaning equipment

1119

AMPCO METAL, INC.

1745 South 38th St.

Milwaukee 46, Wis.

Stock bars, forming dies and punches, guide post bushings, wear strips; examples of ampc alloys, welding electrodes, resistance welding electrodes—tips, wheels, dies

605

B. C. AMES COMPANY

65 Ames St.

Waltham 54, Mass.

Dial indicators, dial gages, dial calipers, thickness measures, small hole gage, dial comparator, design & engineering services, linear dimensional gages

304

ANCHOR COUPLING COMPANY

342 North 4th St.

Libertyville, Ill.

Ductile sleeve coupling; split-flange type clamp flexible hydraulic hose assemblies, couplings and fittings for high, medium and low-pressure applications

834

ANDERSON & SONS, INC.

North Elm and Notre Dame Sts.

Westfield, Mass.

Plant security badge equipment; etched, lithographed, embossed and engraved identification and data plates; dials, panels, scales, rulers and camera components

1309

F. E. ANDERSON OIL COMPANY

Portland, Conn.

Chemical coolants, cutting fluids, rust preventatives, lubricants, cleaners

Booth No.

141

ANGIER CORPORATION

Framingham, Mass.

Coil wrapping, coil wrapping machines, packaging paper, rust and corrosion preventatives, spiral wrapping machines and papers, gummed tapes

614

R. B. ANNIS COMPANY

1101 North Delaware St.

Indianapolis 2, Ind.

Dynamic balancing machine, arbor type balancing machine, electric etchers, demagnetizers

133

ARMSTRONG BROS. TOOL COMPANY

5200 West Armstrong

Chicago 30, Ill.

Tool holders, turret lathe and screw machine tools, cast alloy cutters, carbide cutters, high-speed bits and blades; machine shop specialties, hold-down and setting up tools, lathe and milling machine dogs, clamps, wrenches, pipe tools; "T" slot clamps

1810

ARO EQUIPMENT CORPORATION

1949 Erie Ave.

Bryan, Ohio

Portable air tools, material pumping equipment, lubricating equipment

2042

THE ARROW-HART & HEGEMAN ELECTRIC CO.

103 Hawthorn St.

Hartford 6, Conn.

Magnetic motor starters, magnetic contactors, push button stations (standard duty)

117

ARROW TOOL & REAMER COMPANY

422 Livernois

Detroit, Mich.

Tungsten-carbide tipped and high-speed steel cutting tools; end mills, subland drills, live centers, counterbores, countersinks, reamers.

1510

ATLAS PRESS COMPANY

2073 North Pitcher St.

Kalamazoo 13D, Mich.

Lathes, drill presses, shaper, miller, grinder

1722

THE ATRAX COMPANY

240 Day St.

Newington, Conn.

Carbide burs, rotary files, end mills, reamers, boring bits, boring tools, drills, stub screw machine reamers, countersinks, special tools, internal grinding tools, cutters

Exhibitors, Products . . .

Booth No.

552

AUSTENAL LABORATORIES, INC.

Microcast Division
224 East 39th St.
New York 16, N.Y.

Microcastings high temperature alloys, low alloys, alloy and tool steels

800

AUTOMOTIVE INDUSTRIES

Chestnut and 56th Sts.
Philadelphia 39, Pa.

Automotive Industries magazine

1817

ERIC R. BACHMANN

27-11 41st Ave.
Long Island City 1, N.Y.

Automatic screw machines, instrument makers, bend lathes, drill presses, hand turret lathes, second operation lathes, precision lathes, horizontal boring mills, universal micromillers, tool & cutter grinder

1808

BARNES DRILL COMPANY

814-830 Chestnut St.
Rockford, Ill.

Magnetic coolant separators

1714

E. A. BAUMBACH MANUFACTURING COMPANY

1812-22 South Kilbourn
Chicago 23, Ill.

Die sets; die makers' supplies, bolster plates, Trimm chairs, springs, die jacks, lifting tongs, demountable leader pins and pushings, die rubber

813

BAUSCH & LOMB OPTICAL COMPANY

626 St. Paul St.
Rochester 2, N. Y.

Contour measuring projector, microscopes, Brinell microscope, balchrometer (3" thickness measure), microscope body tubes

409

BAY STATE ABRASIVE PRODUCTS COMPANY

15 Union St.
Westboro, Mass.

Diamond grinding wheel substitutes and allied abrasive products

1219

BEAVER TOOL & ENGINEERING CORPORATION

2850 Rochester Rd.
Rte. 1
Royal Oak, Mich.

Quick change tool holders for milling, drilling and boring machines, solid carbide blade milling cutters, sharpening and setting fixtures for milling cutters, arbors, adaptors, special tools, other milling, drilling and boring machine accessories

Booth No.

1116

BECKETT-HARCUM COMPANY

1140 Wayne Rd.
Wilmington, Ohio

Single and multiple drilling and tapping machines; drill press feeds (side arm); air and hydraulic valves

1424

BELLOWS COMPANY

220 West Market St.
Akron 3, Ohio

Air-power devices including drills, motors, drill press feeds, work feeding, clamping and holding devices; air control units, hydraulic controls

1805

BENCHMASTER MANUFACTURING COMPANY

2952 West Pico Blvd.
Los Angeles 6, Calif.

Punch presses, arbor presses, horizontal and vertical milling machines, rotary tables, friction roll feeds, swivel vises, mill accessories

1717

BENDIX WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY

Elyria, Ohio

Industrial air controls, rolling diaphragm type air cylinders. Three and four-way control valve, variable pressure control valves and miscellaneous air control equipment.

641

BIJUR LUBRICATING CORPORATION

151 West Passaic St.
Rochelle Park, N. J.

Automatic and "one-shot" lubricating systems for machine tools. Special lubricators—small capacity, solenoid-operated and fog lubricators. Lubricant distribution equipment for metered oil flow to different types of bearing. Window units (oil level gages)

1208

BLACK & WEBSTER, INC.

445 Watertown St.
Newton 58, Mass.

Electric impact hammers, time study devices

446

BLACK DRILL COMPANY

1400 East 222nd St.
Cleveland 17, Ohio

Drills, for hardened steel; drilling units, self contained; tool bits, cast alloy

1711

EDWARD BLAKE COMPANY

437 Cherry St.
West Newton 65, Mass.

Flute grinder, tap chamfer grinder, diamond precision drill grinder, cutter sharpener, surface finish standards

Booth No.

1709

HENRY P. BOGGIS & COMPANY
706 East 163rd St.
Cleveland 10, Ohio

Equipment for sharpening taps for reconditioning,
tap-grinders, fixtures for tap sharpening

136

BOICE CRANE COMPANY
930 West Central
Toledo, Ohio

Metal-cutting band saws, combination contour saw
—band filer; abrasive grinding machines, drill
presses

121

BOKUM TOOL COMPANY, INC.
14775 Wildemere Ave.
Detroit 21, Mich.

Boring tools, bottoming tools, internal threading
tools, boring tool holders for engine and turret
lathes, screw machines, jig boring machines, turn-
ing tool holders

1438

BOYAR-SCHULTZ CORPORATION
2110 Walnut St.
Chicago 12, Ill.

Profile grinders, surface grinders, screw ma-
chine tools and tool parts, copper head laps and
—sleeves, special machine bolts, lapping com-
pound

220

BRAMSON PUBLISHING COMPANY
2842 West Grand Blvd.
Detroit 2, Mich.

Publication: PRODUCTION ENGINEERING &
MANAGEMENT

1916

THE BRINNELL COMPANY
Simsbury, Conn.

Damage control systems, clutch—release mechan-
isms for press equipment; electrical control
engineering service

311

THE BRISTOL COMPANY
Waterbury 20, Conn.

Multiple-spline socket set and cap screws; hex
—socket set screws; hex socket head cap screws;
hex flat head socket head cap screws; hex socket
head shoulder screws; hex socket pipe plugs.

1205

BRITISH INDUSTRIES CORPORATION
International Machinery Division
164 Duane St.
New York, N. Y.

British machine tools of the major types

Booth No.

1435

**BROWN & SHARPE MANUFACTURING
COMPANY**
235 Promenade St.
Providence, R. I.

Machinists' tools and gages, electronic measuring
equipment, Johansson gage blocks and accessories,
milling cutters, arbors, collets and adapters, screw
machine tools, permanent magnet chucks, vises,
pumps, ground flat stock

746

CHARLES BRUNING COMPANY
4700 Montrose Ave.
Chicago 41, Ill.

Copying machines, sensitized papers, film and
cloth, drafting furniture, drafting machines, trac-
ing paper and cloths

821

BRUSH DEVELOPMENT COMPANY
3405 Perkins Ave.
Cleveland 14, Ohio

Amplifiers (Instrument AC & DC), oscillographs
(direct writing), pressure recording instruments,
recording oscillographs, strain analyzers, surface
roughness measuring instruments, temperature
recording instruments, torque recording instru-
ments

604

BRYANT CHUCKING GRINDER COMPANY
Clinton St.
Springfield, Vt.

Thread gages

153

BUCK TOOL COMPANY
2015 Schippers Lane
Kalamazoo, Mich.

Collet chucks, scroll chucks, lathe chucks; two,
three, six jaw universal chucks

1113

**BURG TOOL MANUFACTURING
COMPANY**
3743 Durango Ave.
Los Angeles 34, Calif.

Drilling and tapping machines, tool holders,
tapping heads, turret type, automatic indexing

853

CADILLAC STAMP COMPANY
17315 Ryan Rd.
Detroit 12, Mich.

Marking machines

1126

CAMPBELL MACHINE DIVISION
American Chain & Cable Company
Bridgeport 2, Conn.

Cutting machines (cut-off)

Exhibitors, Products . . .

Booth No.

2027 THE CAPEWELL MANUFACTURING COMPANY
Hartford 2, Conn.

High-speed hand hacksaw blades, high-speed power hacksaw blades, pipe and bolt threading machines, pipe threading hand tools, precision ground flat stock, carpenters' curved claw hammers, and machinists' ball pein hammers

539 CARBOLOY DEPARTMENT
General Electric Company
Box 237
Roosevelt Park Post Office
Detroit 32, Mich.

Carboloy cemented carbide tools, wire dies, press dies, masonry drills, diamond dressers, Alnico permanent magnets and applications, chrome carbides, other types of metals

1326 THE CARBORUNDUM COMPANY
Niagara Falls, N. Y.

Abrasive products, grinding wheels, coated abrasives, heating elements, refractory products

137 W. R. CARNES COMPANY
2066 Helene
Madison 4, Wis.

Sump tank cleaning machinery, oil handling equipment, oil filtering equipment, chip trucks

511 CHICAGO DIAL INDICATOR COMPANY
180 North Wacker Dr.
Chicago, Ill.

Dial indicators, indicators, test sets, indicating snap gage, thickness gages, thickness calipers, lens measures, depth gages, tonometers, special indicator fixtures

425 CHICAGO PNEUMATIC TOOL COMPANY
6 East 44th St.
New York 17, N. Y.

Hydraulic riveting equipment; air-driven and electrically-driven power screwdrivers; electric grinding tools

310 CHICAGO TOOL & ENGINEERING COMPANY
8383 South Chicago Ave.
Chicago 17, Ill.

Angle plates and vises, cable connectors, drill press vises, hand vises, milling attachments for lathes, milling machine vises, milling tables, rotary tables.

218 CHICAGO TRAMRAIL COMPANY
400 West Washington
Chicago, Ill.

Selective storage system, cranes, racks

Booth No.

314 CHICAGO WHEEL & MANUFACTURING COMPANY
1101 West Monroe St.
Chicago 7, Ill.

Grinding wheels, small tools

634 CIRCULAR TOOL COMPANY
763 Allens Ave.
Providence 5, R. I.

Metal slitting saws, screw slotting saws, jewelers' saws, in solid carbide and carbide-tipped

346 CITIES SERVICE OIL COMPANY
60 Wall Tower
New York 5, N.Y.

Industrial oils and greases

413 CLECO DIVISION
Reed Roller Bit Company
P. O. Box 2119
Houston, Tex.

Countersink tool, pneumatic riveters, scalers, chip pers, grinders, drills, screwdrivers, nut runners, air line fittings

300 CLEVELAND TAPPING MACHINE COMPANY
Canton, Ohio

Fittings machine and tapping machines

550 WARNER DIVISION
Clinton Machine Company
P. O. Box 3886
Detroit 5, Mich.

Broken tap, drill and dowel pin removers; disintegrator, cold welder, arc welder, etcher, demagnetizer

608 COLLINS MICRO-FLAT COMPANY
2326 East Eighth St.
Los Angeles 21, Calif.

Surface plates

1201 COLONIAL BROACH COMPANY
21601 Hoover Rd.
P. P. Box 37, Harper Station
Detroit, Mich.

Broaching tools, broaching fixtures and broach dressers; marking devices and drill jig bushings

341 COLUMBIA ENTERPRISES, INC.
Grays Lake, Ill.

Columbia #1 vertical milling machine and accessories

Booth No.

1909

COLUMBIA EXPORT COMPANY, INC.
501 Fifth Ave.
New York City 17, N.Y.

Lathes; lead screw and feed shaft lathes; grinding machines; horizontal and vertical milling machine; engraving, copying and reducing machine; drilling machines; centerless cylindrical grinding machine; turret lathe; combined milling, drilling and jig boring machine; automatic screw cutting machines; surface grinding machine

1238

COMMANDER MANUFACTURING COMPANY
4225 West Kinzie St.
Chicago 24, Ill.

Multiple drill units, tappers, chip breakers, turret head, drill press and coolant table

215

CONNORS & DAVIS SALES CORPORATION
Circuit Ave.
West Springfield, Mass.

Spring coiling machines, spring looping tool, metal forming machine, grinding equipment, gears, industrial baking oven

152

CONOVER MAST PUBLICATIONS, INC.
205 East 42nd St.
New York 17, N.Y.

Publications: MILL AND FACTORY, CONSTRUCTION EQUIPMENT, PURCHASING

842

CONTINENTAL TOOLING SERVICE, INC.
19 W. Fourth St.
Dayton, Ohio

Product styling and design, processing and methods planning, cost estimating, tool design, die design, gage design, machine design, tool and machine procurement, expediting, inspection, tool tryout, tool set-up and operator instruction

1750

COSA CORPORATION
405 Lexington Ave.
New York 17, N. Y.

Cutoff machines; automatic screw machines; balancing machines; lathes; burnishing machines; ram shapers; coil winding machines; cold saws; comparators; signal gages; copy milling machines; drilling and tapping machines; drill presses; drills; engraving machines; grinders, grinding spindles; hardness tester, Vickers type; inspection machines; lapping machines; milling machines; pinion cutting machines; saw sharpening machine; toolmaker's microscopes

741

ARTHUR A. CRAFTS COMPANY
603 Newbury St.
Boston, Mass.

Carbide Tools: Carbide compacting dies, carbide gages; diamond tools

Booth No.

1908

CRANE PACKING COMPANY
1800 Cuyler Ave.
Chicago 13, Ill.

Lapmaster automatic lapping machines; mechanical shaft seals, mechanical packing, Teflon products, sealing compounds

1401

CRUCIBLE STEEL COMPANY OF AMERICA
405 Lexington Ave.
New York 17, N.Y.

High-speed, tool, stainless, alloy, machinery, special purpose steel; stainless steel tubing

1138

CRYSTAL LAKE GRINDERS
1948 Crystal Dr.
Crystal Lake, Ill.

Plain cylindrical grinders, universal grinder, surface grinder

1019

DAKE ENGINE COMPANY
633 Monroe St.
Grand Haven, Mich.

Die try-out presses, arbor presses, plastic presses and hydraulic presses

845

DAZOR MANUFACTURING COMPANY
44-87 Duncan Ave.
St. Louis 10, Mo.

Incandescent and fluorescent portable lamps, magnifiers with fluorescent lighting

1904

deCASTRO & ASSOCIATES
1517 Santa Fe
Los Angeles, Calif.

Dial index feeds, punch presses, coolant systems (portable), turret lathes, collet chucks (indexing), drill presses

1610

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Ave.
Chicago 30, Ill.

Die sets; die maker's supplies; cap screws; stripper bolts, socket head; set screws; die springs; precision guide posts; precision bushings; dowel pins

1843

DAYTON ROGERS MANUFACTURING CO.
2835 12th Ave.
Minneapolis 7, Minn.

Small lot stampings, small lot molded plastics, drawn shell trimmer, pneumatic die cushion

Exhibitors, Products . . .

Booth No.

1705

DAVIS BORING TOOL DIVISION
Giddings and Lewis Machine Tool Company
142 Doty
Fond du Lac, Wis.

Expansion type boring head; stub boring tool sets; quick change arbor & sleeves; planer tools; tool holders; boring tools; line boring bars; vertical boring mill tools; single, two & multiple cutter boring blocks; recessing tools

1230

DELPARK CORPORATION
P. O. Box 271
Lebanon, Ind.

Industrial filters, endless belt filter

209

DELTA POWER TOOL DIVISION
Rockwell Manufacturing Company
600 East Vienna Ave.
Milwaukee 1, Wis.

Air hydraulic drill unit, metal shaper, automatic welder, drill presses, disc and belt finishing machines, grinding and deburring machine, cut off machine, tool and cutter grinder, band saws, scroll saw, dust collectors, coolant pump, butt welder, bench centers, surface plate, drill grinding attachment, high production drilling machine

2035

DETREX CORPORATION
14331 Woodrow Wilson
Detroit 32, Mich.

Steel parts formed by cold extrusion using Detrex Extrudite process

140

DETROIT POWER SCREWDRIVER COMPANY
2801 West Fort St.
Detroit 16, Mich.

Screwdriving machines, nut driving machines, hopper feed units, counting machines

115

DETROIT STAMPING COMPANY
350 Midland Ave.
Detroit 3, Mich.

Toggle clamps, portable clamps, milling machine arbor spacers and shims, packaged steel and brass shim stock, packaged feeler gage material, washers and shims, metal stampings, precision flapper valves

2005

DEWALT, INC
Lancaster, Pa.

Woodworking, cutting machines

332

EUGENE DIETZGEN COMPANY, INC.
2425 North Sheffield
Chicago 14, Ill.

Drafting, surveying and reproduction materials, instruments and equipment

Booth No.

243

DILLEY MANUFACTURING COMPANY
1656 Ansel Rd.
Cleveland, Ohio

Magnetic grip-shields; plastic guards

1239

DIVERSIFIED METAL PRODUCTS COMPANY
5125 Alcoa Ave.
Los Angeles 58, Calif.

Centerless grinder

1634

THE DoALL COMPANY
254 North Laurel Ave.
Des Plaines, Ill.

Band machines, filing machines, grinding machines, surface grinders, H.S. steel and carbon cutting tools, carbide-tipped cutting tools, saw bands—all types; hack saws, circular saws, files, abrasives, gage blocks, gage accessories, gage equipment, inspection tools, tool steel, drill rods

208

DOERR ELECTRIC CORPORATION
80 North 3rd St.
Cedarburg, Wis.

Electric motors and motorized gear reducers

711

DOW MECHANICAL CORPORATION
Thompsonville, Conn.

Mechanical, bench and hand comparators; standard HSS tool bits; gages; du-bits

216

DOUGHTY LABORATORIES, INC.
500 Fifth Ave.
New York 36, N. Y.

Steel hardening compound

404

DUMORE COMPANY
14th & Racine Sts.
Racine, Wis.

Tool post grinder, hand grinders, flexible shaft tools, drill grinder, automatic drill head, drilling equipment (small holes)

214

DURABLE PUNCH & DIE COMPANY
1214-22 W. Madison
Chicago, Ill.

Piercing punches, die buttons

837

DURANT MANUFACTURING COMPANY
1929 North Buffum St.
Milwaukee 1, Wis.

Counters; electric contactors; meters, lineal measuring; meters, hour recording; tachometers; wire measuring machines

Booth No.

840

DYNATOMIC CORPORATION
7 S. Dearborn
Suite 912
Chicago 3, Ill.

Carbide tool grinders and grinding wheels; carboground fluid; metalloid cutting fluid; special machine tools and machinery; tube benders; tool engineering and design service; packaging machinery; shell molding machinery; standard machine tools

450

EASTERN MACHINE SCREW CORPORATION
Truman & Barclay Sts.
New Haven, Conn.

Self-opening die heads; self-opening aligning die heads; chasers—hobbed and insert; grinding fixtures for chasers; self-centering and aligning tool holder

1816

EASTERN SALES COMPANY
110 Birdseye St.
Bridgeport 4, Conn.

Staking and assembling presses; air-operated slide feeds; air safety devices; drill chucks, tap, die holders, cams, HSS & carbide form tools, revolving stops and supports for automatic screw machines

1300

EAST SHORE MACHINE PRODUCTS COMPANY
50 E. 201st St.
Euclid 23, Ohio

Broaches

102

EASTERN TOOL COMPANY
155 Prospect
East Hartford, Conn.

Solid carbide tools, diamond wheel dressing machine, adjustable carbide tools, carbide indicator points, adjustable boring tools, special carbide tools.

518

EASTMAN KODAK COMPANY
Rochester 4, N. Y.

Contour projectors; conju-gage gear checkers

526

ECLIPSE COUNTERBORE COMPANY
1600 Bonner Ave.
Detroit 20, Mich.

Counterbores, countersinks; cutters, carbide tipped, drills, spotfacers

217

ELASTIC STOP NUT CORPORATION OF AMERICA
2330 Vauxhall Rd.
Union, N. J.

Elastic stop nuts and rollpins

Booth No.

100

ELECTRO-ARC MANUFACTURING COMPANY
Box 448
Ann Arbor, Mich.

Metal disintegrators, tap extractors

419

ELECTRO MECHANO COMPANY
261 East Erie St.
Milwaukee, Wis.

Variable speed drilling machines; electric tachometers

740

ELGIN NATIONAL WATCH COMPANY
Abrasive Division
Elgin, Ill.

Diamond compound, abrasive honing stones, finishing accessories

318

ELOX CORPORATION
740 North Rochester Rd.
Clawson, Mich.

Drills—hard metal; metal disintegrators, tap extractors

610

ENCO MANUFACTURING COMPANY
4522-24 West Fullerton
Chicago 39, Ill.

Turret tool posts, tailstock turrets, bed turrets, cross slide turrets, compound replacement turrets, cam locking turrets, magnetic base indicator holders, handlites, magnifiers and demagnetizers

125

ENGINEERING MANUFACTURING COMPANY
619 North Commerce
Sheboygan, Wis.

Drafting room furniture, equipment and instruments; drafting stools & benches, drawing kits

633

ENGINEERS SPECIALTIES DIVISION
989 Ellicott St.
Buffalo 9, N.Y.

Gaging by optical projection, including staging fixtures and chart-gage screens; jet blade contour checkers; die contour checkers; Kodak contour projectors; AO optical projection comparators; Stocker and Yale projectors and accessories for all makes of optical comparators

525

ENGIS EQUIPMENT COMPANY
431 South Dearborn St.
Chicago 5, Ill.

Precision instruments, optical tooling instruments, diamond compounds, multiple etching machine

Exhibitors, Products . . .

Booth No.

515

ERCONA CORPORATION
527 Fifth Ave.
New York 17, N.Y.

Microscopes, optical dividing heads, optical bevel protractors, optical protractor level, coincidence level, passameters, indicating snap gages, orthotest precision indicating gaging instrument, optimizer and ultra optimizer, optical comparators and ultra precision gaging instruments

1127

ERICKSON TOOLS DIVISION
Erickson Steel Company
2309 Hamilton Ave.
Cleveland, Ohio

Erickson precision collet chucks, expanding mandrels, adjustable and full floating holders, tap chucks, and related holding tools; speed indexers; air cylinders and air chucks; boring bars

212

ERRINGTON MECHANICAL LABORATORY, INC.
24 Norwood Ave.
Staten Island 4, N. Y.

Multiple drilling heads, tapping chucks (single and multiple spindle); stud, nut and bolt setters, quick change tool holders

1243

ETTCO TOOL COMPANY
594 Johnson Ave.
Brooklyn 6, N. Y.

Drill and tap chucks, tapping attachments, electric indexing fixtures, multiple drilling and tapping equipment, nut tapping machines, tapping machines

545

EUCLID INSTRUMENT COMPANY
743 E. 232nd St.
Euclid, Ohio

Tool-setting gage for jig borers

545

EUCLID TOOL ENGINEERING COMPANY
14689 Euclid Ave.
Cleveland 12, Ohio

Engineering and design service; special machine design & manufacture; technical writing service

1012

EVEREDE TOOL COMPANY
2000 North Parkside Ave.
Chicago 39, Ill.

Machine tool accessories, cutting tools

1708

EX-CELL-O CORPORATION
1200 Oakman Blvd.
Detroit 6, Mich.

Aircraft parts and sub-assemblies; broaches; bushings, (drill jig;) carbide tipped tools; core drills; counterbores, hand-detachable; face mills, inserted blade; form tools; grinding spindles; jet engine blades, nozzles, rotors

Booth No.

1214

THE FALLS PRODUCTS, INC.
Genoa, Ill.

1108

FEDERAL MACHINERY SALES COMPANY
4639 Washington Blvd.
Chicago 44, Ill.

Die heads, collapsing taps, chasers, punch press feeds, abrasive discs, punches and dies, die sets, cutting tools, gages, flexible tubing

733

FEDERAL PRODUCTS CORPORATION
1144 Eddy St.
Providence 5, R. I.

Demonstration of the new Federal air snap gages. Multiple I. D. and O. D. gages, automatic sorting gage, electronic gages, pressureless measuring gages, dial indicators and accessories, dial indicator gages and special indicating gages

312

FIELD ABRASIVE SPECIALTY MANUFACTURING COMPANY
Lowe Bldg.
Dayton, Ohio

Coated abrasive cartridge rolls, cone points, spirals, grit-sticks, sleeves, bands, multiple bands, sanding drums, discs, mandrels, adapters, efficiency kits

725

FIRTH STERLING STEEL & CARBIDE CORPORATION
3113 Forbes St.
Pittsburgh 30, Pa.

Method X machine; cutting tools, machine tools, wire, bar and tube drawing dies; heading and extrusion inserts; diecarb sections for punching and forming

715

FONDA GAGE COMPANY, INC.
59 Daly St.
Stamford, Conn.

Carbide and steel gage blocks

1109

FOOTE BROTHERS GEAR & MACHINE COMPANY
555 Rogers St.
Downers Grove, Ill.

Gears, gearmotors, speed reducers (Helical gear, parallel shaft-in-line, worm gear, helical-worm gear). Enclosed gear drives

738

GAIRING TOOL COMPANY
21221 Hoover Rd.
Detroit 32, Mich.

Standard and special cutting tools and cutting tool holders

Booth No.

1804

GALLAND-HENNING MANUFACTURING COMPANY
Nopak Div.
2753 S. 31st St.
Milwaukee 15, Wis.

Air and hydraulic operating flow control valves and accessories

1231

THE GAMMONS-HOAGLUND COMPANY
Main & Strant Sts.
Manchester, Conn.

Helical reamers and end mills

105

GARLOCK PACKING COMPANY
250 Main St.
Palmyra, N.Y.

Oil seals, gaskets, packing, rotary seals, hydraulic seals

429

GARVIN BROTHERS, INC.
P.O. Box 536
South Bend 24, Ind.

Stud driving and nut running equipment; thread testing equipment

736

GENEVA MACHINE & TOOL CORPORATION
402 Ellamae Ave.
Tampa, Fla.

Geneva drive tail stock spindle, dead centers; new cam design

1801

GEROTOR MAY CORPORATION
1501 Maryland Ave.
Baltimore 3, Md.

Hydraulic pumps and motors

236

H. L. GILMER COMPANY
Division of United States Rubber Company
Keystone St. and Cottmann Ave.
Philadelphia 35, Pa.

"Timing" belts, v-belts, shock pads, flat belts

1809

GLOBE HEAT SEAL, INC.
3380 Robertson Blvd.
Los Angeles 34, Calif.

Hand screw machines, boring bars and holders, self-indexing bed turrets, production cross slides, milling attachments for lathes

119

GOVRO NELSON COMPANY
1931 Antoinette
Detroit 8, Mich.

Automatic drilling and tapping units

Booth No.

1911

GRAHAM MACHINE TOOL COMPANY
231 Centre St.
New York City, N.Y.

Milling machines, vertical milling machines, tool and cutter grinder, shaper, radial drill, jig borer, ram-type milling machine

224

GRAYMILLS CORPORATION
2004 Ridge Ave.
Evanston, Ill.

Coolant pumps; portable pumping systems; stock lubricating devices for sheet and coil steel; "Cold" metal cleaning equipment

805

GREEN INSTRUMENT COMPANY
385 Putnam Ave.
Cambridge, Mass.

Pantograph engraver; instrument panels; rotary tables, self-centering vises, clamping fixtures, cutter grinders; special machinery for production engraving

832

F. T. GRISWOLD MANUFACTURING COMPANY
305 West Lancaster Ave.
Wayne, Pa.

Optical dividing heads, optical indexing tables, alignment telescopes, levels, straightedges, measuring devices

742

GROBET FILE COMPANY OF AMERICA, INC.
421 Canal St.
New York 13, N. Y.

Swiss, rotary files

1827

GUTHERY MACHINE TOOL CORPORATION
130 West 42nd St.
New York 18, N. Y.

Automatic screw machines, engine lathes, production lathes, toolroom lathes, handscrew machines, turret lathes, screw cutting lathes, threading machines, slotting machines, bar pointing machines

128

H. & H. RESEARCH COMPANY
6303 Horatio Ave.
Detroit 10, Mich.

Portable electric reciprocating tools

1800

H. E. B. MACHINE TOOLS, INC.
341 Madison Ave.
New York 17, N. Y.

High speed-hydraulic copying lathe, hydraulic copying lathe, engine lathe with copying attachment, carbide tool and cutter grinder, drivers and accessories

Exhibitors, Products . . .

Booth No.

1628

HAMMOND MACHINERY BUILDERS INC.

1600 Douglas Ave.
Kalamazoo, Mich.

General purpose grinders, abrasive belt grinder-polishers, polishing and buffing lathes, carbide tool grinder (wet and dry), carbide insert grinder, tool vise, dust collectors (cyclone and filter type), pedestal and bench grinders, abrasive belt platen grinders, carbide tool chip breaker and diamond finishing grinders

645

HANCHETT MAGNA-LOCK CORPORATION

P. O. Box 816
Big Rapids, Mich.

Magnetic chucks, parallels, vises; magnetic separators; rectifiers, demagnetizers, voltage regulators and lift magnetics

1818

HANDY & HARMAN

82 Fulton St.
New York 38, N. Y.

Silver brazing alloys, flux; engineering and training service for silver alloy brazing

1625

HANNA ENGINEERING WORKS

1764 Elston Ave.
Chicago 22, Ill.

Air cylinders, hydraulic cylinders, valves; hand operated, pilot, pilot operated, electrically operated, speed control

1609

HANNIFIN CORPORATION

1101 South Kilbourn Ave.
Chicago 24, Ill.

Air and hydraulic cylinders; air control valves; hydraulic presses; hydraulic power units; hydraulic presses and riveters; air presses

150

HANSFORD MANUFACTURING CORPORATION

1239 University Ave.
Rochester 7, N. Y.

A die handler for taking apart heavy dies

829

HANSON-WHITNEY COMPANY

169 Bartholomew Ave.
Hartford 2, Conn.

Visual thread comparators, thread ring and plug gages, taps, multiple thread milling cutters, gear hobs, form milling cutters.

1516

HARDINGE BROTHERS, INC.

934 Anderson St.
Elmira, N. Y.

High-speed precision toolroom lathe, master collets and pads, master feed fingers and pads, speed collet chucks, precision collet index fixtures

Booth No.

333

R. G. HASKINS COMPANY

2651 West Harrison St.
Chicago 12, Ill.

Flexible shaft grinding, polishing, sanding, wire brushing and rotary filing equipment; screwdriving and nut setting machines; bottle capping machines; rotary files

1122

HAYNES STELLITE DIVISION

Union Carbide & Carbon Corporation
30 East 42nd St.
New York 17, N. Y.

Tungsten carbides, wear-resistant alloys, precision castings

424

HEINTZ MANUFACTURING COMPANY

Front St and Olney Ave.
Philadelphia 20, Pa.

Metal stampings and assemblies

316

HELI COIL CORPORATION

Danbury, Conn.

Screw thread inserts and tools for their installation

1325

HENRY & WRIGHT

Division Emhart Manufacturing Company
Hartford 1, Conn.

Dieing machines, automatic high-speed presses, electronic load testing equipment, profile grinding machine

1031

HERCULES PRESSES

Box 96, Postal Station K
Toronto 12, Ont., Can.

Open back inclinable anti-deflection press; mechanical drawing device

814

HERMAN STONE COMPANY

324 Harries Building
Dayton 2, Ohio

Granite surface plates, and straight edges

430

HESTON & ANDERSON

Division of St. Paul Foundry & Manufacturing Company
Fairfield, Iowa

Swing cut-off saws for cutting metals, plastics, wood; air operating unit for faster production, abrasive belt grinder, polisher

418

HITCHCOCK PUBLISHING COMPANY

222 East Willow St.
Wheaton, Ill.

Publications: MACHINE AND TOOL BLUE BOOK; REVISTA INDUSTRIAL; AVISADOR TECNICO

Booth No.

1716

HONAN CRANE CORPORATION
Division Houdaille Hershey Corporation
Lebanon, Ind.

Filter, water-oil separator, oil purifiers, conveyor, automatic clarifier, mobile coolant filter, sump cleaner, magnetic filter

339

HUEBNER PUBLICATIONS
1975 Lee Rd.
Cleveland 18, Ohio

Publication: TOOLING AND PRODUCTION, trade journal of methods and techniques on the design, manufacture and use of production tooling for manufacturing management men

108

HYDROWAY SCALES, INC.
20624 West 8 Mile Rd.
Detroit 19, Mich.

Scales, crane, hydraulic

642

IDEAL INDUSTRIES, INC.
Sycamore, Ill.

Live lathe centers, electric etchers, demagnetizers, soldering equipment, wire strippers, tachometers, lapping tools

1223

ILLINOIS TOOL WORKS
2501 North Keeler Ave.
Chicago 39, Ill.

Hobs, broaches, shaper cutters, milling cutters, form tools, special tools

148

INDEX MACHINE COMPANY
543 North Mechanic
Jackson, Mich.

Horizontal and vertical milling machines; precision rotary table and indexing attachment; all angle double swivel dividing head; milling machine accessories and attachments

315

INDUSTRIAL SCIENTIFIC COMPANY
34 West 33rd St.
New York 1, N. Y.

Probograph, inspection gages, precision measuring instruments

315

INDUSTRIAL TECTONICS, INC.
1900 Jackson Rd.
Ann Arbor, Mich.

Precision balls made of special alloys and materials; alloy stainless steels

1639

INGERSOLL RAND COMPANY
11 Broadway
New York 4, N. Y.

Portable air tools, multi-cycle portable electric tools, coolant pumps, air compressors

Booth No.

615

INTERNATIONAL HARVESTER COMPANY
Manufacturing Research Department
5225 South Western Blvd.
Chicago 9, Ill.

Farm equipment, including farm tractors; industrial power, including crawler tractors; motor trucks, refrigerators, baler and binder twine, steel

800

THE IRON AGE
100 East 42nd St.
New York 17, N. Y.

Publication: IRON AGE; Reprints

1023

MACHINE TOOL DIVISION
Kalamazoo Tank & Silo Co.
508 Harrison St.
Kalamazoo 16, Mich.

Metal cutting band saw machines

1926

KAUFMAN MANUFACTURING COMPANY
29th and Meadow Lane
Manitowoc, Wis.

Hydraulically operated combination boring & tapping or threading machine; pneumatically controlled lead screw tapping machine

2050

KELVIN SYSTEMS CORPORATION
53 Water St.
South Norwalk, Conn.

Universal tool post; Italian machine tools

1723

KENNAMETAL, INC.
700 Lloyd Ave.
Latrobe, Pa.

Single point tools; milling cutters; ball strip mill rolls; miscellaneous wear parts

2003

KLINGELHOFER MACHINE TOOL COMPANY
20 Prospect St.
Westfield, N. J.

Drilling machines, hand grinders, mechanical and hydraulic shapers, cold sawing machines, horizontal milling machines, lathes, grinding machines

1011

THE KORFUND COMPANY, INC.
48-15 32nd Place
Long Island City 1, N. Y.

Vibration control products—shock mountings

Exhibitors, Products . . .

Booth No.

1000

KURT ORBAN COMPANY
20-21 West St.
New York 6, N. Y.

Lathes, grinders, broaching machine, shapers, vertical tool milling and jig boring machine, super-finishing lathe, hand screw machine, balancing machine

1922

J & S TOOL COMPANY, INC.
477 Main St.
East Orange, N. J.

Grinding wheel dressing equipment, machinists' clamps, cutting tools

324

JANNEY CYLINDER COMPANY
State Rd. and Shelmire
Holmesburg
Philadelphia 36, Pa.

Finished machined centrifugal castings of brass, bronze, alloy irons, stainless steel, monel metal, ni-resist irons, including pump liners, compressor liners, valve seat rings, shaft sleeves, bearing separator rings, jet engine parts, casing and impeller rings, diesel engine liners, and other cylindrical shapes

1534

CHARLES L. JARVIS COMPANY
Stack St. & Pease
Middletown, Conn.

Flexible shaft machines; tapping attachments; multiple tapping heads; HSS rotary files; tungsten carbide rotary files; high-speed ground thread taps; tungsten carbide boring bits; tungsten carbide end mills; tungsten carbide reamers; tungsten carbide knurls; tungsten carbide internal grinding tools

743

J. G. JERGENS COMPANY
11106 Avon Ave.
Cleveland 5, Ohio

Pilot bushings, pressure rolls, live centers, steady rest and backup rolls

350

JERGENS TOOL SPECIALTY COMPANY
712 East 163rd St.
Cleveland 10, Ohio

Jig and fixture component parts, screw products, chuck jaw blanks, hand knobs, hand wheels, crank handles, sine fixture keys, tee set kits, tee bolts, slot bolts, thread cleaners, sioux tools, and miscellaneous shop tools

701

C. E. JOHANSSON GAGE COMPANY
8900 Alpine
Detroit, Mich.

Amplifiers, internal indicators, gage blocks, surface finish indicators, dynamometers, micrometers, snap gages, minikators, mikrokators

72

Booth No.

1840

JOHANSSON & WINDLE COMPANY
6015 Dahlin Dr.
Skokie, Ill.

Vertical milling machine

111

ERIC S. JOHNSON COMPANY
230 East Ohio St.
Chicago 11, Ill.

Chucks; reamers, machine; stud drivers; tapping attachments; tool holders

817

JOHNSON GAGE COMPANY
534 Cottage Grove Rd.
Bloomfield, Conn.

Thread gages and thread comparators

104

S. C. JOHNSON & SON
Carnu St.
Racine, Wis.

Metal forming waxes and coolants for deep drawing, stamping, piercing, and blanking, sawing, grinding, tapping, drilling

1918

LANDIS MACHINE COMPANY
5th & Church Sts.
Waynesboro, Pa.

Thread cutting die heads and collapsible taps

325

LAPEER MANUFACTURING COMPANY
3056 Davison Road
Lapeer, Mich.

Toggle action clamps, pliers and wrenches; brake bonding machine; cycle bonding equipment; air operated clamps and cylinders

438

LAST WORD SALES & ENGINEERING COMPANY
18500 Mt. Elliott
Detroit 34, Mich.

Angle tangent to radius grinding wheel dressers and heavy duty offset boring chucks

1732

LATROBE ELECTRIC STEEL COMPANY
1944 Haller St.
Latrobe, Pa.

"Desegatized" high-speed steels, high carbon-high chromium die steels, tool & die steels

1411

JONES & LAMSON MACHINE COMPANY
40 Woolson St.
Springfield, Vt.

Optical comparators and measuring machines, comparator screens & charts, automatic stationary & revolving die heads; ground thread chasers, chaser sharpening machines

Booth No.

347

K. O. LEE COMPANY
1st Ave. at So. Congress St.
Aberdeen, S. D.

Universal grinders, tool and cutter grinders, grinder accessories and fixtures, keyless drill chucks, expanding mandrels, abrasive wheel dressers, chuck center sets, reamer drives, adjustable reamers, tool post grinders, portable electric tools.

2030

LEES BRADNER COMPANY
6210 Carnegie St.
Cleveland, Ohio

Threading machines, chucks

1333

LINDBERG ENGINEERING COMPANY
2450 West Hubbard St.
Chicago 12, Ill.

Tool and die furnaces; air and hydraulic cylinders and valves

1525

LIPE ROLLWAY CORPORATION
806 Emerson Ave.
Syracuse 1, N. Y.

Pneumatic bar feeds; automatic magazine-loading, bar feed

2013

F. J. LITTELL MACHINE COMPANY
4127 Ravenswood
Chicago 13, Ill.

Roll feeds, reels, winders, straightening machines, air ejectors, pres-vac safety feeders

338

LODDING, INCORPORATED
79 Beacon St.
Worcester 1, Mass.

Clamp assemblies and fixture details

1130

LOGAN ENGINEERING COMPANY
Lawrence & Lamon Aves.
Chicago 30, Ill.

Bench lathes, engine lathes, toolroom lathes, turret lathes, shaper, accessories

1529

LOGANSPORT MACHINE COMPANY, INC.
40 Payson Rd.
Logansport, Ind.

Air and hydraulic cylinders and valves, power operated chucks, hydraulic power units; coolant pumps, steel tube fittings

Booth No.

1009

LOVEJOY TOOL COMPANY, INC.
2077 Safford St.
Springfield, Vt.

Inserted tooth milling cutters, face mills, side mills, slotting cutters, adapters, boring heads, boring bars, flywheels, stainless steel and armor plate production performance data

809

THE LUFKIN RULE COMPANY
1730 Hess St.
Saginaw, Mich.

Precision tools, measuring tapes, rules

505

THE McCASKEY REGISTER COMPANY
2500 South Union Ave.
Alliance, Ohio

McCaskey industrial control systems; tool crib and gage control; quality control forms; tool order scheduling, various forms

1227

McCROSKY TOOL CORPORATION
1938 Thomas St.
Meadville, Pa.

Inserted-blade cutting tools; reamers, milling cutters, boring bars; specials; machine tool attachments; quick-change chucks, turret tool posts.

1217

M-B PRODUCTS
46 Victor
Detroit 3, Mich.

Portable pneumatic grinders, bench type pneumatic grinders, air line filters, air pressure regulators, automatic air line lubricators

2025

M B I EXPORT & IMPORT, LTD.
475 Grand Concourse
Bronx 51, N. Y.

Milling machines, boring mills, lathes, presses, surface grinders, long surface grinders

846

MACHINERY,
Industrial Press, Publishers
140-148 Lafayette
New York 13, N. Y.

Machine tool trade papers, engineering books

841

MACKLIN COMPANY
1936 Lawrence Blvd.
Jackson, Mich.

Grinding wheels, abrasive products, abrasives

Exhibitors, Products . . .

Booth No.

308 **MAGNA ENGINEERING CORPORATION**
110 Linfield Dr.
Menlo Park, Calif.

Single and multi-spindle drilling machines and feed drill heads and drill presses. Special purpose production drilling machines

501 **MAGNAFLUX CORPORATION**
5900 Northwest Hwy.
Chicago 31, Ill.

Automatic punch press feeder

441 **MANHATTAN RUBBER**
Division Raybestos Manhattan, Inc.
Passaic, N. J.

Abrasive wheels, diamond wheels, moldiscs for sanders

1212 **MARTINDALE ELECTRIC COMPANY**
Box 617, Edgewater Branch
Lakewood, Cleveland 7, Ohio

Rotary burs and files, metal cutting saws, mica undercutting saws, flexible shaft grinding machines, motor and generator repair and maintenance equipment, electric etchers, electric testing instruments, portable blowers, protective dust masks

1019 **MARVIN MACHINE PRODUCTS, INC.**
414 Ford Bldg.
Detroit 26, Mich.

Dividing heads, rotary tables, vertical mill attachments, slotters and boring heads

205 **MASTER MANUFACTURING COMPANY**
1300 East Ave. A
Hutchinson, Kan.

Lathe converters, self-powered milling attachments and universal tool post grinders for lathes, milling heads for turrets and mills, slotting and internal keyseating attachments, dividing heads for lathes, portable milling machine

109 **MASTERFORM TOOL COMPANY**
2532 Irving Park Rd.
Chicago 18, Ill.

Flat and circular form tools, reamers, counterbores and standard recess tools

1318 **JAS. H. MATTHEWS & COMPANY**
3942 Forbes St.
Pittsburgh 13, Pa.

Marking machines, nameplate-stamping machines, tag-embossing machine, stencil-making machines, spray masks, rubber marking devices; tags, checks, etched panels and nameplates; steel stamps and dies

Booth No.

430 **MECHANICAL DEVELOPMENT CORPORATION**
1627 Beaver Ave.
Pittsburgh 33, Pa.

Small centers; surface plate with indicator

2012 **MECHANICAL AIR CONTROLS**
15311 West 11 Mile Rd.
Royal Oak, Mich.

Air valves actuated by solenoid, hand, foot, cam and pilot pressure

804 **MERZ ENGINEERING COMPANY**
200 South Harding St.
Indianapolis, Ind.

Standard gages, aircraft engine parts, air gages, electronic comparators, electronic height gages, electronic sorting & gaging machines, experimental machine work, special machines; tools, dies, jigs and fixtures

739 **METAL CARBIDES CORPORATION**
107 East Indianola Ave.
Youngstown 7, Ohio

Tungsten carbide cutting tools and tips, drawing dies, centerless grinder blades, drill jig bushings, rolling mill work rolls, solid carbide bars, strips, rods, tubes, and diamond grinding wheels, core bits and wheel dressers

200 **METAL CUTTING TOOLS, INC.**
301 South Water St.
Rockford, Ill.

High-speed steel and carbide tipped standard and special end cutting tools, counterbores, counter-sinks, multi-diameter cutters

1811 **METAL LUBRICANTS COMPANY**
3211 South Wood St.
Chicago, Ill.

Cleaning compounds, cutting oils, drawing oils and compounds, greases, grinding oils and compounds, hydraulic oils, lubricants, quenching oils, soluble oils, tempering oils

535 **THE METAL REMOVAL COMPANY**
1014 North Ashland Ave.
Chicago 22, Ill.

Porcelain bonded mounted wheels, HSS and carbide tools, grinding equipment, abrasives, abrasive segments and grinding wheels

734 **METRO TOOL & GAGE COMPANY**
4240 Peterson
Chicago 30, Ill.

Thread gages, gaging fixtures, special gages, carbide standard cutting tools, carbide special form tools, carbide masonry drills

Booth No.

1826

W. F. MEYERS COMPANY
Meyers Bldg.
Bedford, Ind.

Carbide inserted drill bushings, carbide slitting cutters, carbide tipped saws, carbide tools, radi-form wheel and tool former (radius generating attachment for grinding machines)

1200

MICHIGAN TOOL COMPANY
7171 East McNichols
Detroit, Mich.

Speed reducer, gear sets, gear cutting tools

309

MICRO-LATHE-PLATE, INC.
1265 West 2nd St.
Cleveland 13, Ohio

Lathe accessories; adjustable face plate & work-holding fixtures

732

MICROMETRICAL MANUFACTURING COMPANY
(Formerly Physicists Research Co.)
345 South Main St.
Ann Arbor, Mich.

Profilometer equipment

818

**MICRO-POISE ENGINEERING
& SALES COMPANY**
14851 Grand River
Detroit, Mich.

Balancing machine and balance engineering data

416

MICRO SWITCH
Division Minneapolis Honeywell Regulator
Freeport, Ill.

Precision snap-action switches, explosion-proof switches, heavy duty limit switches, rotary selector switches, special circuit toggle switches, splash-proof switches, foot switches, mercury switches, gaging switches

2004

MILFORD RIVET & MACHINE COMPANY
1000 Merwin Rd.
Milford, Conn.

Tubular and split rivet setting machines

1731

MILLER MOTOR COMPANY
2040 North Hawthorne
Melrose Park, Ill.

Air cylinders, hydraulic cylinders, fluid pressure boosters, air-oil cylinders

120

A. MILNE & COMPANY
745 Washington St.
New York 14, N. Y.

Tool and die steels, solid and hollow; dies, tools, gages.

Booth No.

1102

MODERN INDUSTRIAL ENGINEERING COMPANY
14230 Birwood Ave.
Detroit 4, Mich.

Gear burring & chamfering machines; form cutting tools

651

MODERN MACHINE SHOP
Gardner Publications, Inc.
431 Main St.
Cincinnati 2, Ohio

Publication: MODERN MACHINE SHOP

412

MODERNAIR CORPORATION
400 Preda St.
San Leandro, Calif.

Air and hydraulic cylinders, clamps, valves, collet chucks, machine tool conversion kits, air drill press feeds, air arbor presses, air saw feeds, milling machine feeds and airline control units

824

MOORE PRODUCTS COMPANY
H and Lycoming Sts.
Philadelphia 24, Pa.

Pneumatic comparator gages and industrial instruments

1250

MOREY MACHINERY COMPANY
410 Broome St.
New York 13, N. Y.

Boring mills, radial drills, lathes, milling machines, presses, grinders, saw and filing machines

1015

MORTON MACHINE WORKS
2425 Wolcott
Ferndale 20, Mich.

Jack locks, clamp assemblies, long travel cam locks, soft chuck jaw blanks, clamp straps, cams, eye bolts, alloy studs, extension nuts, T-slot nuts, collar nuts, spherical collar nuts, washers, acorn nuts, rest pads, keys, quarter turn screws, hand knobs, hand wheels, rest buttons, button jig feet, knurled head screws, "C" washers, shoulder screws, clamp rests, swing bolts, handles, steel ball handles

1022

NATIONAL BROACH & MACHINE COMPANY
5600 St. Jean Ave.
Detroit 2, Mich.

Broaching tools, tool holders and fixtures; gear measuring machines, gear shaving cutters, gear sound-testing machines

232

NATIONAL MACHINE TOOL COMPANY
1536 Clark St.
Racine, Wis.

Drill press vise, shears, nibblers, punches and rod cutters, shaper vise attachment, fixture lock

Exhibitors, Products . . .

Booth No.

1815 **NATIONAL TOOL COMPANY**
11200 Madison Ave.
Cleveland 2, Ohio

Special cutting tools; pocket comparators

410 **NELCO TOOL COMPANY**
266 Center St.
Manchester, Conn.

Carbide tipped cutting tools; solid carbide hard steel drills, metal slitting saws and reamers; milling machine shell milling arbors

239 **NEW HERMES ENGRAVING MACHINE CORPORATION**
13-19 University Place
New York 3, N.Y.

Portable and bench type engraving machines

1313 **NIAGARA MACHINE AND TOOL WORKS**
637 Northland Ave.
Buffalo 11, N. Y.

Squaring shears, circle shears, slip roll former, bar folder, multidrive power table, flanger, hand tools

745 **NICHOLSON FILE COMPANY**
65 Acorn St.
Providence 1, R. I.

Hand steel files and rasps, rotary power files and burs

533 **NILSSON GAGE COMPANY, INC.**
P. O. Box 505
Poughkeepsie, N. Y.

Carbide gages, chrome gages, comparator dial snap gages, dial gages, external indicator gages, groove gages, master setting discs, pistol-grip bore gages, reversible plug gages, ring gages, snap gages

124 **NORD INTERNATIONAL CORPORATION**
50 Church St.
New York 7, N. Y.

Profiling tool

1931 **C. A. NORGREN COMPANY**
222 Santa Fe Dr.
Denver 9, Colo.

Air line filter with automatic drain, pressure regulator, air filter, aircraft hose fittings and hose assemblies

1039 **NORTON COMPANY**
1 New Bond St.
Worcester 6, Mass.

Abrasives, grinding wheels, tumbling abrasive, refractories

76

Booth No.

132 **OAKITE PRODUCTS, INC.**
22 Thames St.
New York 6, N. Y.

Cleaning compounds, deodorizing materials, de-rusting compounds, descaling compounds, drawing and stamping compounds, grinding lubricants, machining compounds, paint removers, spray booth water treatment, steam cleaning equipment, surface preparation material

1425 **THE OHIO CRANKSHAFT COMPANY**
Tocco Division
3800 Harvard Ave.
Cleveland 1, Ohio

High frequency induction heating equipment

1338 **O'NEIL IRWIN MANUFACTURING COMPANY**
297 Eighth Ave.
Lake City, Minn.

Benders, brakes, shears, notchers, punches, rollers and rod parters—manually operated. Benders, shears, notchers, punches and rod parters—power operated

2017 **ORTMAN MILLER MACHINE COMPANY, INC.**
1222 150th St.
Hammond, Ind.

Air cylinders, hydraulic cylinders, boosters, speed control valves, flow control valves

1838 **OSBORN MANUFACTURING COMPANY**
5401 Hamilton Ave.
Cleveland 14, Ohio

Power driven brushes, paint and varnish brushes, maintenance brushes, work holder and brushing lathe

734 **O-VEE GAUGE COMPANY**
2516 West Vernon Ave.
Los Angeles 8, Calif.

Screw thread measuring gages & comparators, dial indicators, borescopes, micrometers, universal joints

1322 **PANGBORN CORPORATION**
10 Pangborn Blvd.
Hagerstown, Md.

Wet blast cleaning cabinet

247 **PARKER RUST PROOF COMPANY**
2177 East Milwaukee
Detroit, Mich.

Bonderite, corrosion preventives, paint primers

The Tool Engineer

Booth No.

238

PARKWOOD LAMINATES
Wakefield, Mass.

Laminated die stock material, laminated jig and fixture material, laminated plastics

546

PENTON PUBLISHING COMPANY
Penton Bldg.
Cleveland 13, Ohio

Publications: STEEL, FOUNDRY, MACHINE DESIGN and NEW EQUIPMENT DIGEST; technical books

810

PERFEX GAGE & TOOL COMPANY
123 Avery St.
Mt. Clemens, Mich.

Thread gages; radius tangent to angle dresser

1034

PERRISH STEEL PRODUCTS, INC.
1206 S. Maple Ave.
Los Angeles 15, Calif.

French machine tools

346

PETROLEUM ADVISERS
60 Wall Tower
New York 5, N. Y.

Lubricants and greases

301

PINES ENGINEERING COMPANY, INC.
601 Walnut Ave.
Aurora, Ill.

Tube bending machine; tube and rod end finishing machine

1528

PIONEER PUMP & MANUFACTURING COMPANY
19679 John R St.
Detroit 3, Mich.

Impeller type and positive displacement type pumps for circulating coolants, lubricants and abrasive liquids for general machine tool and industrial use

547

PIONEER TOOL & ENGINEERING COMPANY
3914 West Shakespeare
Chicago 47, Ill.

Tools, dies, jigs, fixtures, gages, and special machines; precision instrumentation checking equipment; precision instrumentation casting manufacture

343

PIVOT PUNCH & DIE CORPORATION
373 Old Niagara Place
North Tonawanda, N. Y.

Pivot punches

Booth No.

1830

PORTER PRECISION PRODUCTS
P. O. Box 99
Cincinnati 31, Ohio

Drill fixture (automatic), die bushing and punches, punches and dies, standard punches

512

PRATT & WHITNEY DIVISION
Niles-Bement-Pond Company
West Hartford 1, Conn.

Cutting tools: Taps, dies, cutters, reamers, carbide-tipped tools, special cutting tools. Gages: conventional gages, precision gage blocks, basic measuring equipment, comparators, continuous mill gages. Portable equipment burs; high-speed steel, carbon steel, and carbide; carbide die sinking cutters, diaform wheel forming attachments, pneumatic grinding heads

1005

PRECISE PRODUCTS COMPANY
1328-30 Clark St.
Racine, Wis.

Portable electric grinder-millers

1713

PRECISION DETROIT COMPANY
2126 Fairview Ave.
Detroit 14, Mich.

PDC automatic assembly press; air-operated index table

313

PRECISION DIAMOND TOOL COMPANY
102 South Grove Ave.
Elgin, Ill.

Diamond dressing tools, diamond cutting tools, diamond hand hones, diamond grinding wheels, carbide grinding—Method PLC

340

PRECISION GRINDING WHEEL COMPANY, INC.
8301 Torresdale Ave.
Philadelphia 36, Pa.

Grinding wheels and abrasives

1624

PROCUNIER SAFETY CHUCK COMPANY
18 South Clinton St.
Chicago 6, Ill.

High-speed precision tapping and threading attachments; universal tapping machines; tap chucks; friction tap chucks; chucks and collets

2008

PRODUCTION MACHINE COMPANY
Greenfield, Mass.

Centerless grinding and finishing machines using abrasive belts for bars, tubes and other cylindrical products

Exhibitors, Products . . .

Booth No.		Booth No.	
1104	THE PRODUCTO MACHINE COMPANY 990 Housatonic Ave. Bridgeport, Conn. Die makers' accessories, die sets, die springs, dowel pins, feed (automatic press), punches and dies, scrap chopper, tapping machine, vises	225	RICHARDS BROTHERS Div. of Allied Products Corp. 1560 E. Milwaukee Ave. Detroit 11, Mich. Standard and special interchangeable punches and die buttons, including new line of clinch nut tools
437	PROGRESSIVE WELDER SALES COMPANY 3070 East Outer Dr. Detroit 34, Mich. Coolant coolers	421	J. A. RICHARDS COMPANY 903-5-7 North Pitcher Kalamazoo, Mich. Bending machines, air and hand-operated, for bending, blanking, punching, cutting, cold rolled, hot rolled, spring steel, stainless steel, brass, copper and aluminum
439	PUTNAM TOOL COMPANY 2981 Charlevoix Ave. Detroit 7, Mich. End mills, counterbores and reamers	1027	RIVETT LATHE & GRINDER, INC. 18 Riverview Rd. Boston 35, Mass. Air cylinders, hydraulic cylinders, air valves, hydraulic valves, hydraulic pump units
408	R AND L TOOLS COMPANY 1825 Bristol St. Nicetown Philadelphia, Pa. Turning tools, tap and die holders, universal tool posts, knurling tools, carbide and roller backrests, floating drill holders, backrest holder for turret, revolving stock stops, cut-off blade holders, re-leasing acorn die holder, recessing tool	336	ROWE MACHINERY MANUFACTURING COMPANY 1506 N. Industrial Blvd. Dallas, Tex. Automatic straightening machine; pinch roll and "Easy Load" automatic coil stock cradle
432	RACINE TOOL & MACHINE COMPANY 1770 State St. Racine, Wis. Variable volume pumps; pressure boosters, hydraulic valves and reservoir units	2026	ROSS OPERATING COMPANY 120 East Golden Gate Detroit 3, Mich. Direct and pilot operated straightway 3-way and 4-way valves in sizes from $\frac{1}{4}$ " to 2" for hand, foot, solenoid, cam and air actuation; speed control, quick exhaust and sequence valves
603	RAHN GRANITE SURFACE PLATE COMPANY 641 N. Western Ave. Dayton 7, Ohio Surface plates, angle plates, parallels, straight edges	1938	H. B. ROUSE & COMPANY 2214-16 North Wayne Ave. Chicago 14, Ill. Hand miller and fixture set-ups
1017	THE READY TOOL COMPANY 550 Iranistan Ave. Bridgeport, Conn. Centers, dogs, tool holders, boring bars, vise hold downs, ball-bearing slides for machine tools	1101	ROYAL OAK TOOL & MACHINE COMPANY 623 East Fourth St. Royal Oak, Mich. D-S radial relief fixture
519	REPUBLIC GAGE COMPANY 2228 Fenkell Ave. Detroit 21, Mich. Thread gages, plain gages, measuring wires, special type gages, pipe gages	147	JOSEPH T. RYERSON & SON, INC. P. O. Box 8000 A Chicago 80, Ill. Alloy steels, ground flat stock, bar stock
1214	RICE PUMP & MACHINE COMPANY 226 North Milwaukee St. Grafton, Wis. Die filers, profile grinders		

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| <p>Booth No.
1050 S & S MACHINERY COMPANY
140 53rd St.
Brooklyn, N. Y.</p> <p>Horizontal & vertical milling machines, geared head lathes, radial drills, injection molding machines, turret lathes, automatic screw machines, shapers, universal and plain cylindrical grinders</p> <p>1621 SALES SERVICE MACHINE TOOL COMPANY
2363 University Ave.
St. Paul 4, Minn.</p> <p>Power presses, air friction clutch, shapers, power hack saws</p> <p>352 SALVO TOOL & ENGINEERING COMPANY
26441 Gratiot Ave.
Roseville, Mich.</p> <p>Thread rolling equipment for all types of automatic screw machines, turret lathes, engine lathes and Bullard Mult-au-matics</p> <p>601 GEORGE SCHERR COMPANY, INC.
200 Lafayette St.
New York 12, N. Y.</p> <p>Alignment telescopes, calipers, comparator gages, gear testers, height gages, internal comparators, micrometers, micro-hardness testers, optical comparators, optical dividing heads, surface testers, tachometers, microscopes, optical bevel protractors, magnifiers (illuminated), magnetic chuck adapters, gage blocks</p> <p>433 A. SCHRADER'S SON
Division Scoville Manufacturing Company, Inc.
470 Vanderbilt Ave.
Brooklyn 17, N. Y.</p> <p>Air cylinders, operating valves; pneumatic machine controls, air line fittings</p> <p>1319 SCHRAMM, INC.
West Chester, Pa.</p> <p>Air compressors</p> <p>1511 SCULLY-JONES & COMPANY
1901 South Rockwell St.
Chicago 8, Ill.</p> <p>Chucking tools, drill stops, floating holders, automatic recessing tools, drill and tap chucks, milling machine arbors and adapters, adapters for multiple spindle machines, tap driving tools, engineering and design service</p> <p>440 SEIBERT & SONS, INC.
East Peoria 8, Ill.</p> <p>Slip spindle assemblies, bracket spindle assemblies, spindle arms, universal joints, lower joint assemblies, upper joint assemblies, pinion drive shafts, morse taper adapters</p> | <p>Booth No.
1930 THE SENTRY COMPANY
64 Main St.
Foxboro, Mass.</p> <p>High-speed steel hardening furnace; diamond blocks and accessories</p> <p>719 SERVICE DIAMOND TOOL COMPANY
2505 Burdette Ave.
Ferndale, Mich.</p> <p>Diamond hardness testing machine and diamond tools</p> <p>1420 SERVICE MACHINE COMPANY
7627-33 South Ashland
Chicago, Ill.</p> <p>Punch presses</p> <p>414 SEVERANCE TOOL INDUSTRIES, INC.
706 Iowa Rd.
Saginaw, Mich.</p> <p>Midget mills, carbo-mills, deburring cutters, tube deburring cutters, countersinks, ball seat reamers, econo-sinks and special cutting tools in both high-speed steel and carbide</p> <p>710 THE SHEFFIELD CORPORATION
Springfield & Thomas
Dayton 1, Ohio</p> <p>Standard precision gages and measuring instruments for process control and toolroom or gage laboratory; collapsible taps and self-opening die-heads; grinding attachments; X-ray types of gages for continuous inspection of moving strip</p> <p>1408 SHELDON MACHINE COMPANY, INC.
4258 North Knox Ave.
Chicago 41, Ill.</p> <p>Lathes, milling machines, shapers</p> <p>112 SHELL OIL COMPANY
50 West 50th St.
New York 20, N. Y.</p> <p>Cutting oils and fluids, rust preventives and lubricating oils and greases</p> <p>1314 SIMONDS ABRASIVE COMPANY
Division of Simonds Saw & Steel Company
510 Safety Fund Bank Bldg.
Fitchburg, Mass.</p> <p>Grinding wheels and other bonded abrasive products and abrasive grain</p> <p>704 SIZE CONTROL COMPANY
2500 West Washington
Chicago 12, Ill.</p> <p>Thread plug gages; plain and thread rings; thread and gear measuring wires; cabinet sets; special gages; snap gages; master setting discs. Materials: steel, chrome, carbide, norbide.</p> |
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Exhibitors, Products . . .

Booth No.

233 SOCONY-VACUUM OIL COMPANY, INC.
26 Broadway
New York 4, N. Y.

Lubricants and greases

1216 SOUTH BEND LATHE WORKS
South Bend 22, Ind.

Lathes, precision, turret, engine and bench; drill presses, shaper, lathe accessories, collets, drill press accessories, shaper accessories, surface plate, angle plate, v-block

1142 SPECIAL ENGINEERING SERVICE, INC.
8161 Livernois Ave.
Detroit 4, Mich.

Coil stock feeds, stock straighteners, coil stock cradles, stock cradles with power straighteners, scrap cutters

1727 THE STANDARD ELECTRICAL TOOL COMPANY
2488-96 River Rd.
Cincinnati 4, Ohio

Carbide tool grinders, speed lathes, precision grinding heads, polishing and buffing lathe

532 STANDARD GAGE COMPANY, INC.
80 Parker Ave.
Poughkeepsie, N. Y.

Dializer for A. G. D. snap gages, dial indicators, comparators, adjustable limit gages

1535 STANDARD PRESSED STEEL COMPANY
Box 732
Jenkintown, Pa.

Socket head cap screws, self-locking set screws, shoulder screws, dryseal pressure plugs, dowel pins, hex keys, self-locking nuts, steel shop equipment and material handling equipment, steel shaft collars, and power transmitting appliances

639 THE STAPLES TOOL COMPANY
2851 Massachusetts
Cincinnati 25, Ohio

Tungsten carbide tipped expansion and solid reamers, tipped core drills, end mills and counterbores

833 THE L. S. STARRETT COMPANY
101 Crescent St.
Athol, Mass.

Mechanics' hand measuring tools and precision instruments, steel tapes, dial indicators, hacksaws, hand saws and hand knives and precision ground flat stock

Booth No.

611 STEEL CITY TESTING MACHINE, INC.
8843 Livernois Ave.
Detroit 4, Mich.

Portable hardness testing hammer, ductility testing machine, proving ring, Brinell microscope and other accessories

1102 STEELCRAFT TOOL COMPANY
14238 Birwood Ave.
Detroit 4, Mich.

H.S.S. form tools and cutters; H.S.S. standard cutting tools

1900 THE STEEL PRODUCTS ENGINEERING COMPANY
1150 West Main St.
Springfield, Ohio

Trimming dies

1839 STERLING GRINDING WHEEL DIVISION
Cleveland Quarries
1430 Broad St.
Tiffin, Ohio

Bonded silicon carbide wheels, toolroom wheels, carbide tool wheels, easymounts and wheels, chucks and segments

204 STEWART WARNER CORPORATION
1826 Diversey Pkwy.
Chicago 14, Ill.

Centralized lubrication systems; barrel to bearing lubrication equipment; oil mist lubrication system

1139 EDWIN B. STIMPSON COMPANY, INC.
100 Franklin Ave.
Brooklyn 5, N. Y.

Eyelets, rivets, stampings, terminals, arrows and hands, screw machine parts, washers, grommets and washers, ferrules, posts and screws, hole plugs, snap fasteners, and other miscellaneous metal articles

508 STOKERUNIT CORPORATION
4548 West Mitchell St.
Milwaukee 14, Wis.

Boring machines, boring heads and accessories

1028 STOKVIS, EDERA & COMPANY, INC.
21 East 26th St.
New York 10, N. Y.

Engine lathes, horizontal boring and milling machines, Universal milling machines, precision tool-makers, and bench lathes, surface grinders, shapers

Booth No.

447

STONE MACHINERY COMPANY, INC.
Syracuse, N. Y.

High-speed cut-off machines; abrasive and semi-high-speed steel saw cutoff

844

STRONG CARLISLE & HAMMOND COMPANYMac It Products Division
1392 West Third St.
Cleveland 13, Ohio

Heat-treated alloy steel screws including socket head cap screws, hollow set screws, hollow lock screws, square head set screws, tool post screws

1823

D. A. STUART OIL COMPANY, LTD.2727 South Troy St.
Chicago 23, Ill.

Cutting oils, cutting fluids, lubricants

337

SUB-ZERO PRODUCTS MANUFACTURING DIVISIONDeepfreeze Distributing Corporation
3932 Reading Rd.
Cincinnati 29, Ohio

Chilling machine; refrigeration equipment

1724

SUNNEN PRODUCTS COMPANY7910 Manchester Ave.
St. Louis 17, Mo.

Honing machines; portable honing equipment; accessories

1429

SUPER TOOL COMPANY2160 Hoover Rd.
Detroit 13, Mich.

Carbide tools for milling, turning, facing, drilling; carbide centers, carbide reamers, carbide counterbores

849

SUPERDRAULIC CORPORATION14256 Wyoming Ave.
Detroit 4, Mich.

Industrial hydraulic equipment, pumps, valves and related equipment; test stands, power units and positive hydraulic remote control

420

SUTTON TOOL COMPANY

Sturgis, Mich.

Lathe collets; collet chucks; screw machine collets, feeders and accessories; special expanding arbors, boring bars, small aircraft parts

Booth No.

624

THE TAFT-PEIRCE MANUFACTURING COMPANY44 Mechanic St.
Woonsocket, R. I.

Tool room accessories, air gages, plain and thread gages, power-driven thread gage, magnetic chucks, contract and engineering services, gage blocks

246

THE TEXAS COMPANY135 East 42nd St.
New York 17, N. Y.

Cutting oils, grinding oils, quenching oils, hydraulic oils, drawing compounds

451

THOMAS FLEXIBLE COUPLING COMPANYMaine Ave. and Biddle
Warren, Pa.

Flexible couplings for power transmission

1927

THE TOMKINS-JOHNSON COMPANY614 North Mechanic St.
Jackson, Mich.

Rivet setting machines, clinchnut setting machines, air and hydraulic cylinders, remote control valves, speed control valves, die sinking milling cutters

401

THE TOOL ENGINEER10700 Puritan Ave.
Detroit 21, Mich.

THE TOOL ENGINEER magazine and other ASTE publications

242

TORIT MANUFACTURING COMPANY292 Walnut St.
St. Paul 2, Minn.

Unit type dust collectors, for grinders, polishing lathes, woodworking machinery and related applications

1912

TRI-STATE MACHINERY COMPANYP. O. Box 8051
3041 West Liberty Ave.
Pittsburgh 16, Pa.

Radial drill; full automatic torque adjustable drilling and tapping chucks

707

TUBULAR MICROMETER COMPANY1001 Armstrong Blvd.
St. James, Minn.

Precision measuring tools, micrometers, vernier tools, rules, scales, squares, dial indicators, gages

317

TUBULAR RIVET & STUD COMPANY

Wollaston 70, Mass.

Tubular rivets, split rivets, automatic riveting machines

Exhibitors, Products . . .

Booth No.

1316

TURNER BROTHERS
2625 Hilton
Ferndale 20, Mich.

Automatic power indexing tables, special machines, jigs and fixtures

2029

TUTHILL PUMP COMPANY
939 East 95th St.
Chicago, Ill.

Lubricating pumps, coolant pumps, pumps for hydraulic service, relief valves

1030

SYCOMON
C/o Amlintool, Inc.
9 Rockefeller Plaza
New York 20, N. Y.

1013

UNION MANUFACTURING COMPANY
Church at Railroad
New Britain, Conn.

Die sets, die set pins, die set bushings, die set springs

520

UNIVERSAL CYCLOPS
Bridgeville, Pa.

Tool steels, hot work steels, stainless steels, heat resisting steels, super alloys, specialty steels

442

UNIVERTICAL MACHINE COMPANY
14831 West 11 Mile Rd.
Royal Oak 2, Mich.

Gilding metal safe; T hammers

221

UTICA DROP FORGE & TOOL CORPORATION
Utica, N. Y.

Pliers, nippers, adjustable wrenches

1331

V & O PRESS COMPANY
Division of Emhart Manufacturing
Hudson, N. Y.

High-speed power press, punch press feeder, inclinable type press

536

VANADIUM-ALLOYS STEEL COMPANY
Rezak Ave.
Latrobe, Pa.

Cutting tools and dies made from vanadium-alloy tool steels

1210

VAPOR BLAST MANUFACTURING COMPANY
3025 West Atkinson
Milwaukee, Wis.

82

Booth No.

1317

VAPOR BLAST MANUFACTURING COMPANY
3025 West Atkinson
Milwaukee, Wis.

Liquid Honing machines

1942

VERSA-MIL COMPANY
30 Church St.
New York 7, N. Y.

Milling, drilling, boring and grinding machine

2031

VERSON ALL-STEEL PRESS
1355 East 93rd St.
Chicago 19, Ill.

Mechanical and hydraulic presses, press brakes, and tooling, stamping and forging equipment

1208

VIKING INDUSTRIES
220 Montague St.
Rockford, Ill.

Bench lathe, bench milling machine, bench surface grinder, portable elevators and shop lifts (hydraulic), turret drives for all makes of turrets, hydraulic milling machines, horizontal hydraulic production machines

650

VIKING TOOL COMPANY
P. O. Box 286
Nichols Rd.
Shelton, Conn.

Single-point inserted carbide-turning tools; inserted type dual adjustment milling cutters and face mills

321

VLIER MANUFACTURING COMPANY
4552 Beverly Blvd.
Los Angeles 4, Calif.

Torque thumb screws, spring plungers, spring stops, fixture keys, toggle pads, quick clamps, component parts for jigs and fixtures

400

VONNEGUT MOULDER CORPORATION
Madison Ave. at Caven St.
Indianapolis 25, Ind.

Brush-backed polishing head and pneumatically tensioned abrasive belts for various types of polishing, deburring and contour finishing

543

M. PAUL WAHLUND MECHANICAL LABORATORY OF ENGINEERS
Grant 16, Iowa

Production tools and attachments for small lathes (13" and under)

751

WALDES KOHINOOR, INC.
Austel Place
Long Island City 1, N. Y.

Retaining rings and pliers, grooving tool

Booth No.

1412

WALES-STRIPPIT CORPORATION

345 Payne Ave.
North Tonawanda, N. Y.

Cutting and forming tools for metal-forming machines; drilling machines, nibbling machines; presses, mechanical, punch

1905

WALKER-TURNER DIVISION

Kearney & Trecker Corporation
639 South Ave.
Plainfield, N. J.

Metal cutting band saws, drill presses, flexible shaft machines, automatic feeds

139

WARD LEONARD ELECTRIC COMPANY

53 West Jackson Blvd.
Chicago 4, Ill.

Chrome plating equipment

643

WAUKESHA TOOL COMPANY

1434 Arcadian Ave.
Waukesha, Wis.

Reamers, counterbores & special cutting tools with adjustable HSS and carbide-tipped blades

351

THE WEATHERHEAD COMPANY

300 East 131st St.
Cleveland 8, Ohio

Hydraulic tube fittings in steel, stainless steel and brass; hydraulic hose and reusable hose ends; industrial tube and pipe fittings

705

WEBBER GAGE COMPANY

12900 Trisket Road
Cleveland 11, Ohio

Angle precision gage blocks; carbide precision gage blocks

305

WELDON TOOL COMPANY

3000 Woodhill Rd.
Cleveland 4, Ohio

End mills, end mill holders, end mill sharpening fixtures, counterbores, form tool sharpening and measuring fixtures, lathe measuring attachments, screw machine cutting tools, screw machine cams, pumps, special cutting tools

646

WESSON COMPANY

1220 Woodward Heights Blvd.
Ferndale 20, Mich.

Inserted blade face milling cutters, mechanical carbide holders, carbide lathe tools, vises

1016

WESTINGHOUSE AIR BRAKE COMPANY

Industrial Products Division
1943 Herman Ave.
Wilmerding, Pa.

Air compressors, pneumatic control systems, pneumatic devices, air cylinders

Booth No.

240

WEST POINT MANUFACTURING COMPANY

19625 Merriman Ct.
Farmington, Mich.

Standard fixture fittings, clamps, keys, rest buttons, locating pins, hand wheels, hand knobs, clamping details, J. I. C. standard high tensile T-slot bolts and studs

747

WETMORE REAMER COMPANY

418 North 27th St.
Milwaukee 8, Wis.

Inserted blade reamers in both solid shank and shell type, piloted line reamers, boring tools, boring bars, facing heads, and high-speed steel and tungsten carbide replacement blades

1105

WICKMAN MANUFACTURING COMPANY

15533 Woodrow Wilson
Detroit 3, Mich.

Resinoid bonded diamond wheels, steel bonded diamond wheels, carbide grinding and lapping machine, universal carbide tool and cutter grinder, tapping attachments

1915

WIEDEMANN MACHINE COMPANY

4272 Wissahickon Ave.
Philadelphia, Pa.

Turret punch presses

635

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway
Detroit 1, Mich.

Tungsten carbide tipped tools for forming, milling, drilling, reaming, boring. Broaches, wire drawing and shaped dies, gages and gage bushing, mandrels, rest blades, saws, boring tool tips, diamond wheel dressing tools

1126

WILSON MECHANICAL INSTRUMENT COMPANY

230 Park Ave.
New York 17, N. Y.

Hardness testers

237

WILTON TOOL MANUFACTURING COMPANY

925 Wrightwood Ave.
Chicago 14, Ill.

Work positioners, welding positioners, industrial vises and clamps

840

WINTER ENGINEERING CORPORATION

1200 Niagara St.
Buffalo 19, N. Y.

Carbide tool grinders and grinding wheels; carbo-grind fluid, metalloid cutting fluid; special machine tools and machinery

1323

N. A. WOODWORTH COMPANY

1300 East 9 Mile Rd.
Detroit 20, Mich.

Chucks, arbors, jigs, ring and plug gages

Products Index . . .

Abrasives, basic products

Abrasives div., Elgin National Watch Co.; 704
 Bay State Abrasive Products Co.; 409
 The Carborundum Co.; 1326
 The DoAll Co.; 1634
 Field Abrasive Specialty Mfg. Co.; 312
 Macklin Co.; 841
 The Metal Removal Co.; 535
 Norton Co.; 1039
 Precision Grinding Wheel Co.; 340
 Simonds Abrasive Co.; 1314

Adapters

Beaver Tool & Engineering Corp.; 1219
 Brown & Sharpe Mfg. Co.; 1435
 Lovejoy Tool Co., Inc.; 1009
 Scully-Jones & Co.; 1511

Amplifiers

The Brush Development Co.; 821
 C. E. Johansson Gage Co. div., Swedish Gage Co. of America; 701

Angle plates

Acme Tool Co.; 128
 Chicago Tool & Engineering Co.; 310
 Rahn Granite Surface Plate Co.; 603
 South Bend Lathe Works; 1216

Arbors

Beaver Tool & Engineering Corp.; 1219
 Brown & Sharpe Mfg. Co.; 1435
 Davis Boring Tool div., Giddings & Lewis Machine Tool Co.; 1705
 Nelco Tool Co., inc.; 410
 Scully-Jones & Co.; 1511
 Sutton Tool Co.; 420
 N. A. Woodworth Co.; 1323

Badge equipment

Anderson & Sons, Inc.; 834

Balancing machines

R. B. Annis Co.; 614
 Cosa Corp.; 1750
 Micro-Poise Engineering & Sales Co.; 818
 Kurt Orban Co., Inc.; 1000

Belts

L. H. Gilmer Co. div., U. S. Rubber Co.; 236

Bonding equipment

Lapeer Mfg. Co.; 325

Boring bars

Davis Boring Tool div., Giddings & Lewis Machine Tool Co.; 1705
 Globe Heat-Seal, Inc.; 1809
 Lovejoy Tool Co., Inc.; 1009
 McCrosky Tool Corp.; 1227
 The Ready Tool Co.; 1017
 Sutton Tool Co.; 420
 Wetmore Reamer Co.; 747

Boring heads

Davis Boring Tool div., Giddings & Lewis Machine Tool Co.; 1705
 Lovejoy Tool Co., Inc.; 1009
 Marvin Machine Products, Inc.; 1019
 Stokerunit Corp.; 508

Boring machines

American SIP Corp.; 1917
 Eric R. Bachmann; 1817
 Graham Machine Tool Co.; 1911
 M. B. I. Export & Import Ltd.; 2025
 Kurt Orban Co.; 1000
 Stokerunit Corp.; 508

Brazing alloys

Handy & Harman; 1818

Broaches

Colonial Broach Co.; 1201
 East Shore Machine Products Co.; 1300
 Ex-Cell-O Corp.; 1708
 Illinois Tool Works; 1223
 J & S Tool Co., Inc.; 1922
 National Broach & Machine Co.; 1022
 National Tool Co.; 1815
 Willey's Carbide Tool Co.; 635

Brushes

Osborn Mfg. Co.; 1838

Bushings, drill jig

Accurate Bushing Co.; 838
 Colonial Broach Co.; 1201
 Ex-Cell-O Corp.; 1708

Bushings, guide post

Ampco Metal, Inc.; 1119

Castings

Janney Cylinder Co.; 324
 Ampco Metal, Inc.; 1119
 Microcast div., Austenal Laboratories, Inc.; 552

Centers

Arrow Tool & Reamer Co.; 117
 Ideal Industries, Inc.; 642
 Mechanical Development Corp.; 430
 The Ready Tool Co.; 1017
 Super Tool Co.; 1429

Chucks

American Machine & Foundry Co.; 1131
 Brown & Sharpe Mfg. Co.; 1435
 Buck Tool Co.; 153
 Erickson Tools div., Erickson Steel Co.; 1127
 Errington Mechanical Laboratory, Inc.; 212
 Etico Tool Co.; 1243
 Hanchett Magna-Lock Corp.; 645
 Eric S. Johnson Co.; 111
 Last Word Sales Co.; 438
 K. O. Lee Co.; 347
 Logansport Machine Co., Inc.; 1529
 McCrosky Tool Corp.; 1227

Chucks, cont.

Modemair Corp.; 412
Procumer Safety Chuck Co.; 1624
Sterling Grinding Wheel div., The Cleveland Quarries Co.; 1839
Sutton Tool Co.; 420
Taft-Pierce Mfg. Co.; 624
Tri-State Machinery Co.; 1912
Viking Industries; 1208
N. A. Woodworth Co.; 1323

Cleaning equipment

American Wheelabrator & Equipment Corp.; 1215
Graymills Corp.; 224
Oakite Products, Inc.; 132
Pangborn Corp.; 1322
Vapor Blast Mfg. Co.; 1210

Collets

Brown & Sharpe Mfg. Co.; 1435
de Castro & Associates; 1904
Harding Brothers, Inc.; 1516
Sutton Tool Co.; 420

Comparators

Cosa Corp.; 1750
Dow Mechanical Corp.; 711
Engineers Specialties Div.; 633
Ercora Corp.; 515
Hanson-Whitney Co.; 829
Jones & Lamson Machine Co.; 1411
Moore Products Co.; 824
National Tool Co.; 1815
Pratt & Whitney div., Niles-Bement-Pond Co.; 512
George Scherr Co., Inc.; 601

Compressors, air

Industrial Products div., Westinghouse Air Brake Co.; 1016
Ingersoll-Rand Co.; 1639
Schramm, Inc.; 1319

Control Systems

Arrow-Hart & Hegeman Electric Co.; 2042
The Bellows Co.; 1424
Nopak div.; Galland-Henning Mfg. Co.; 1804

Control Systems, printed form

The McCaskey Register Co.; 505

Counterbores

Arrow Tool & Reamer Co.; 117
Eclipse Counterbore Co.; 526
Ex-Cell-O Corp.; 1708
Masterform Tool Co.; 109
Metal Cutting Tools, Inc.; 200
Putnam Tool Co.; 439
Staples Tool Co.; 639
The Weldon Tool Co.; 305

Countersinks

Super Tool Co.; 1429
Arrow Tool & Reamer Co.; 117
The Atrax Co.; 1722

Circular Tool Co., Inc.; 634
Cleco div., Reed Roller Bit Co.; 413
Eclipse Counterbore Co.; 526
Metal Cutting Tools, Inc.; 200
Severance Tool Industries, Inc.; 414

Counting devices

Detroit Power Screwdriver Co.; 140
Durant Mfg. Co.; 837

Cut-off wheels

The Allison Co.; 1204
Manhattan Rubber div., Raybestos-Manhattan, Inc.; 441

Cutting and forming tools for metalworking machines

Armstrong Brothers Tool Co.; 133
Arrow Tool & Reamer Co.; 117
The Atrax Co.; 1722
Bokum Tool Co., Inc.; 121
Arthur A. Crafts Co., Inc.; 741
The DoAll Co.; 1634
Eastern Tool Co.; 102
Eclipse Counterbore Co.; 526
Everede Tool Co.; 1012
Ex-Cell-O Corp.; 1708
Federal Machinery Sales Co.; 1108
Firth Sterling Steel & Carbide Corp.; 725
Gairing Tool Co.; 738
Hanson-Whitney Co.; 829
Illinois Tool Works; 1223
J & S Tool Co., Inc.; 1922
Kennametal, Inc.; 1723
Lovejoy Tool Co., Inc.; 1009
Masterform Tool Co.; 109
McCrosky Tool Corp.; 1227
Metal Carbides Corp.; 739
Metal Cutting Tools, Inc.; 200
Metro Tool & Gage Co.; 734
W. F. Meyers Co., Inc.; 1826
Modern Industrial Engineering Co.; 1102
National Tool Co.; 1815
Nelco Tool Co., Inc.; 410
Pioneer Tool & Engineering Co.; 547
Pratt & Whitney div., Niles-Bement-Pond Co.; 512
Precision Diamond Tool Co.; 313
R and L Tools; 408
Rowe Machinery & Mfg. Co., Inc.; 336
Service Diamond Tool Co.; 719
Severance Tool Industries, Inc.; 414
Steelcraft Tool Co.; 1102
Super Tool Co.; 1429
The Viking Tool Co.; 650
The Weldon Tool Co.; 305
Willey's Carbide Tool Co.; 635

Cutters, milling

Armstrong Brothers Tool Co.; 133
Arrow Tool & Reamer Co.; 117
The Atrax Co.; 1722
Beaver Tool & Engineering Corp.; 1219
Brown & Sharpe Mfg. Co.; 1435
Carboloy Dept., General Electric Co.; 539
Arthur A. Crafts Co., Inc.; 741

Products Index . . .

Cutters, milling

The DoAll Co.; 1634
 Eastern Tool Co.; 102
 Eclipse Counterbore Co.; 526
 Ex-Cell-O Corp.; 1708
 Federal Machinery Sales Co.; 1108
 Firth Sterling Steel & Carbide Corp.; 725
 Gairing Tool Co.; 738
 Gammons-Hoaglund Co.; 1231
 Hanson-Whitney Co.; 829
 Illinois Tool Works; 1223
 The Charles L. Jarvis Co.; 1534
 Kennemetal, Inc.; 1723
 Lovejoy Tool Co., Inc.; 1009
 McCrosky Tool Corp.; 1227
 Metal Carbides Corp.; 739
 Metal Cutting Tools, Inc.; 200
 Metro Tool & Gage Co.; 734
 Modern Industrial Engineering Co.; 1102
 National Tool Co.; 1815
 Nelco Tool Co., Inc.; 410
 Pratt & Whitney div., Niles-Bement-Pond Co.; 512
 Putnam Tool Co.; 439
 Severance Tool Industries, Inc.; 414
 Staples Tool Co.; 639
 Steelcraft Tool Co.; 1102
 Super Tool Co.; 1429
 Tomkins-Johnson Co.; 1927
 The Viking Tool Co.; 650
 Weldon Tool Co.; 305
 Wesson Co.; 646
 Willey's Carbide Tool Co.; 635

Cutting equipment, flame

American Pullmax Co., Inc.; 1943

Cutting fluid

F. E. Anderson Oil Co.; 1309
 Dynatomic Corp.; 840
 S. C. Johnson & Son, Inc.; 104
 Metal Lubricants Co.; 1811
 Oakite Products, Inc.; 132
 Cities Service Oil Co.; 346
 Shell Oil Co.; 112
 D. A. Stuart Oil Co., Ltd.; 1823
 The Texas Co.; 246
 Winter Engineering Corp.; 840

Cylinders, air

Erickson Tools div., Erickson Steel Co.; 1127
 Hanna Engineering Works; 1625
 Hannifin Corp.; 1609
 Industrial Air Controls div., Bendix-Westinghouse Automotive Air Brake Co.; 1717
 Industrial Products div., Westinghouse Air Brake Co.; 1016
 Lindberg Engineering Co.; 1333
 Miller Motor Co.; 1731
 Modernair Corp.; 412
 Ortman-Miller Machine Co., Inc.; 2017
 Rivett Lathe & Grinder, Inc.; 1027
 A. Schrader's Son div., Scovill Mfg Co., Inc.; 433
 Tomkins-Johnson Co.; 1927

Cylinders, hydraulic

Hanna Engineering Works; 1625
 Hannifin Corp.; 1609
 Lindberg Engineering Co.; 1333
 Miller Motor Co.; 1731
 Modernair Corp.; 412
 Ortman-Miller Machine Co., Inc.; 2017
 Rivett Lathe & Grinder, Inc.; 1027
 The Tomkins-Johnson Co.; 1927

Demagnetizers

R. B. Annis Co.; 614
 Enco Mfg. Co.; 610
 Hanchett Magna-Lock Corp.; 645
 Ideal Industries, Inc.; 642
 Warner div., Clinton Machine Co.; 550

Diamond wheels

Bay State Abrasive Products Co.; 409
 Carboloy Dept., General Electric Co.; 539
 Manhattan Rubber div., Raybestos-Manhattan, Inc.; 441
 Metal Carbides Corp.; 739
 Precision Diamond Tool Co.; 313
 The Wickman Mfg. Co.; 1105

Die accessories

E. A. Baumbach Mfg. Co.; 1714
 Danly Machine Specialties, Inc.; 1610
 Durable Punch & Die Co.; 214
 Eastern Machine Screw Corp.; 450
 Producto Machine Co.; 1104
 Richard Bros. div., Allied Products Corp.; 225
 Union Mfg. Co.; 1013
 Willey's Carbide Tool Co.; 635

Die casting machines

British Industries Corp.; 1205

Dies, drawing

Adamas Carbide Corp.; 1301
 Carboloy Dept., General Electric Co.; 539
 Firth Sterling Steel & Carbide Corp.; 725
 Willey's Carbide Tool Co.; 635

Dies, forming

Ampco Metal, Inc.; 1119
 Arthur A. Crafts Co., Inc.; 741
 Federal Machinery Sales Co.; 1108
 Porter Precision Products; 1830

Die sets

Allegheny Ludlum Steel Corp.; 1218
 E. A. Baumbach Mfg. Co.; 1714
 Danly Machine Specialties, Inc.; 1610
 Federal Machinery Sales Co.; 1108
 Pratt & Whitney div., Niles-Bement-Pond Co.; 512
 Producto Machine Co.; 1104
 Union Mfg. Co.; 1013

Dies, trimming

Dayton Rogers Mfg. Co.; 1843
 Steel Products Engineering Co.; 1900

Dowel pins

Allen Mfg. Co.; 116
Danly Machine Specialties, Inc.; 1610
Producto Machine Co.; 1104

Drafting equipment

Charles Bruning Co., Inc.; 746
Eugene Dietzgen Co.; 332
Engineering Mfg. Co.; 125

Drilling heads

Commander Mfg. Co.; 1238
The Dumore Co.; 404
Errington Mechanical Laboratory, Inc.; 212
Magna Engineering Corp.; 308

Drilling machines

American SIP Corp.; 1917
Atlas Press Co.; 1510
Eric R. Bachmann; 1817
Beckett-Harcum Co.; 1116
Boice-Crane Co.; 136
British Industries Corp.; 1205
Burg Tool Mfg. Co.; 1113
Cleco div., Reed Roller Bit Co.; 413
Columbia Export Co., Inc.; 1909
Cosa Corp.; 1750
Delta Power Tool div., Rockwell Mfg. Co.; 209
The Dumore Co.; 404
The Electro-Mechano Co.; 419
Elox Corp.; 318
Graham Machine Tool Co.; 1911
Ingersoll-Rand Co.; 1639
Klingelhofer Machine Tool Co.; 2000
Magna Engineering Corp.; 308
Morey Machinery Co., Inc.; 1250
Perrish Steel Products, Inc.; 1034
South Bend Lathe Works; 1216
Tri-State Machinery Co.; 1912
Versa-Mil Co.; 1942
Wales-Strippit Corp.; 1412
Walker-Turner div., Kearney & Trecker Corp.; 1905

Drills

Ace Drill Corp.; 144
Arrow Tool & Reamer Co.; 117
The Atrax Co.; 1722
Black Drill Co.; 446
Carboloy Dept., General Electric Co.; 539
Circular Tool Co., Inc.; 634
Cosa Corp.; 1750
Arthur A. Crafts Co., Inc.; 741
Metra Tool & Gage Co.; 734
Nelco Tool Co., Inc.; 410
Staples Tool Co.; 639
Super Tool Co.; 1429
Waukesha Tool Co.; 643
Willey's Carbide Tool Co.; 635

Drill units

Black Drill Co.; 446

Commander Mfg. Co.; 1238
Delta Power Tool div., Rockwell Mfg. Co.; 209
Govro Nelson Co.; 119

Dust collectors

Delta Power Tool div., Rockwell Mfg. Co.; 209
Hammond Machinery Builders, Inc.; 1628
Torit Mfg. Co.; 242

Electrical Equipment

The Brinnell Co.; 1916

Engineering and design services

B. C. Ames Co.; 605
Continental Tooling Service, Inc.; 842
Dynatomic Corp.; 840
Euclid Tool Engineering Co.; 545
Joseph T. Ryerson & Son, Inc.; 147
Scully-Jones & Co.; 1511
Taft-Peirce Mfg. Co.; 624
Winter Engineering Corp.; 840

Engraving machines

British Industries Corp.; 1205
Columbia Export Co., Inc.; 1909
Cosa Corp.; 1750
Green Instrument Co., Inc.; 805
New Hermes Engraving Machine Corp.; 239

Etching machines

R. B. Annis Co.; 614
Engis Equipment Co.; 525
Ideal Industries, Inc.; 642
Martindale Electric Co.; 1212
Warner div., Clinton Machine Co.; 550

Extrusion compounds

Detrex Corp.; 2035

Fasteners

Elastic Stop Nut Corp. of America; 217
Edwin B. Stimpson Co., Inc.; 1139
Tubular Rivet & Stud Co.; 317
Waldes Kohinoor, Inc.; 751

Feed mechanisms

Benchmaster Mfg. Co.; 1805
Detroit Power Screwdriver Co.; 140
Federal Machinery Sales Co.; 1108
Hardinge Bros., Inc.; 1516
F. J. Littell Machine Co.; 2013
Lipe-Rollway Corp.; 1525
Magnaflux Corp.; 1117
Modernair Corp.; 412
Producto Machine Co.; 1104
Special Engineering Service, Inc.; 1142
Sutton Tool Co.; 420
The V & O Press Co. div., Emhart Mfg. Co.; 1331
Walker-Turner div., Kearney & Trecker Corp.; 1905

Filters

W. R. Carnes Co.; 137
Delpark Corp.; 1230
Honan-Crane Corp.—Houdaille-Hershey Corp.; 1716

Products Index . . .

Filters, cont.

M-B Products; 1217
C. A. Norgren Co.; 1931

Fittings, pipe, tube, airline

Anchor Coupling Co., Inc.; 304
Cleco div., Reed Roller Bit Co.; 413
Logansport Machine Co., Inc.; 1529
C. A. Norgren Co.; 1931
A. Schrader's Son. div., Scoville Co., Inc.; 433
The Weatherhead Co.; 351

Flexible couplings

Thomas Flexible Coupling Co.; 451

Flexible shaft machines

R. G. Haskins Co.; 333
The Charles L. Jarvis Co.; 1534
Pratt & Whitney div., Niles-Bement-Pond Co.; 512
Walker-Turner div., Kearney & Trecker Corp.; 1905

Furnaces

Lindberg Engineering Co.; 1333
The Sentry Co.; 1930

Gage blocks

Brown & Sharpe Mfg. Co.; 1435
The DoAll Co.; 1634
Fonda Gage Co., Inc.; 715
C. E. Johansson Gage Co. div., Swedish Gage Co. of America; 701
Pratt & Whitney div., Niles-Bement-Pond Co.; 512
George Scherr Co., Inc.; 601
Taft-Peirce Mfg. Co.; 624
Webber Gage Co.; 705

Gages, hand

B. C. Ames Co.; 605
Bryant Chucking Grinder Co.; 604
Brown & Sharpe Mfg. Co.; 1435
Chicago Dial Indicator Co.; 511
Arthur A. Crafts Co., Inc.; 741
The DoAll Co.; 1634
Dow Mechanical Corp.; 711
Ercona Corp.; 515
Federal Machinery Sales Corp.; 1108
Federal Products Corp.; 733
Hanson-Whitney Co.; 829
C. F. Johansson Gage Co. div., Swedish Gage Co. of America; 701
Johnson Gage Co.; 817
Merz Engineering, Inc.; 804
Metro Tool & Gage Co.; 734
Nilsson Gage Co., Inc.; 533
O-Vee Gage Co.; 734
Perfex Gage & Tool Co.; 810
Pioneer Tool & Engineering Co.; 547
Pratt & Whitney div., Niles-Bement-Pond Co.; 512
Republic Gage Co.; 519
George Scherr Co., Inc.; 601
The Sheffield Corp.; 710
Size Control Co.; 704
Standard Gage Co., Inc.; 532
The L. S. Starrett Co.; 833
Taft-Peirce Mfg. Co.; 624

Wiley's Carbide Tool Co.; 635
N. A. Woodworth Co.; 1323

Gages, dial type

B. C. Ames Co.; 605
Chicago Dial Indicator Co.; 511
Cosa Corp.; 1750
Eric S. Johnson Co.; 111
Nilsson Gage Co., Inc.; 533
O-Vee Gage Co.; 734
George Scherr Co., Inc.; 601
Standard Gage Co., Inc.; 532
The L. S. Starrett Co.; 833
Tubular Micrometer Co.; 707

Gages, tool setting

Euclid Instrument Co.; 1300

Gears

Connors & Davis Sales Corp.; 215
Foote Bros. Gear & Machine Co.; 1109
Michigan Tool Co.; 200

Gear cutters

Cosa Corp.; 1750
Michigan Tool Co.; 1200
National Broach & Machine Co.; 1022

Grinding machines

Atlas Press Co.; 1510
Columbia Export Co. Inc.; 1909
Connors & Davis Sales Corp.; 215
Cosa Corp.; 1750
Crystal Lake Grinders; 1138
Delta Power Tool div., Rockwell Mfg. Co.; 209
Diversified Metal Products Co.; 1239
Ingersoll-Rand Co.; 1639
Klingelhofer Machine Tool Co.; 2000
K. O. Lee Co.; 347
M-B Products; 1217
M. B. I. Export & Import Ltd.; 2025
Morey Machinery Co., Inc.; 1250
Kurt Orban Co., Inc.; 1000
Precise Products Co.; 1005
Production Machine Co.; 2008
Rice Pump & Machine Co.; 1214
Stokvis, Edera & Co., Inc.; 1028
Viking Industries; 1208

Grinding machines, abrasive

Boice-Crane Co.; 136
Hammond Machinery Builders, Inc.; 1628

Grinding machines, tap

Henry P. Boggis & Co.; 1709

Grinding machines, tool

Eric R. Bachman; 1817
Beaver Tool & Engineering Corp.; 1219
Edward Blake Co.; 1711
Boyar Schultz Corp.; 1438
D-S Grinder div., Royal Oak Tool & Machine Co.; 1101
Delta Power Tool div., Rockwell Mfg. Co.; 209
The DoAll Co.; 1634

Grinding machines, cont.

The Dunmore Co.; 404
Dynamatic Corp.; 840
Graham Machine Tool Co.; 1911
H. E. B. Machine Tools, Inc.; 1800
Hammond Machinery Builders, Inc.; 1628
Henry & Wright div., Emhart Mfg. Co.; 1325
K. O. Lee Co.; 347
M. B. I. Export & Import Ltd.; 2025
Master Mfg. Co.; 205
Metal Carbides Corp.; 739
Precision Diamond Tool Co.; 313
The Wickman Mfg. Co.; 1105
Winter Engineering Corp.; 840

Grinding wheels

The Allison Co.; 1204
Bay State Abrasive Products Co.; 409
The Carborundum Co.; 1326
Chicago Wheel & Mfg. Co.; 314
Dynamatic Corp.; 840
Federal Machinery Sales Co.; 1108
Field Abrasive Specialty Mfg. Co.; 312
Macklin Co.; 841
Manhattan Rubber div., Raybestos-Manhattan, Inc.; 441
The Metal Removal Co.; 535
Norton Co.; 1039
Precision Grinding Wheel Co.; 340
Simonds Abrasive Co.; 1314
The Sterling Grinding Wheel div., The Cleveland Quarries Co.; 1839
Winter Engineering Corp.; 840

Heaters, induction

Allis-Chalmers Mfg. Co.; 1728
Tocco div., The Ohio Crankshaft Co.; 1425

Honing machines

Sunnen Products Co.; 1724
Vapor Blast Mfg. Co.; 1317

Instruments, inspection testing, and measuring

American Cystoscope Makers, Inc.; 825
American SIP Corp.; 1917
Bausch & Lomb Optical Co.; 813
Brown & Sharpe Mfg. Co.; 1435
The Brush Development Corp.; 821
Campbell Machine div., American Chain & Cable Co.; 1126
Chicago Dial Indicator Co.; 511
Cosa Corp.; 1750
Dazor Mfg. Corp.; 845
The DoAll Co.; 1634
Dow Mechanical Corp.; 711
Durant Mfg. Co.; 837
Eastman Kodak Co.; 518
Engineers Specialties Div.; 633
Engis Equipment Co.; 525
Ercosa Corp.; 515
Federal Products Corp.; 733
Garryn Bros., Inc.; 429
F. T. Griswold Mfg. Co.; 832
Ideal Industries, Inc.; 642

Industrial-Scientific Co.; 1411

C. E. Johansson Gage Co. div.; Swedish Gage Co. of America; 701

Johnson Gage Co.; 817

Jones & Lamson Machine Co.; 1411

The Lufkin Rule Co.; 809

Magnaflux Corp.; 501

Merz Engineering, Inc.; 804

Micrometrical Mfg. Co.; 732
(Formerly—Physicists Research Co.)

Moore Products Co.; 824

National Broach & Machine Co.; 1022

National Tool Co.; 1815

Nilsson Gage Co., Inc.; 533

O-Vee Gauge Co.; 734

Pioneer Tool & Engineering Co.; 547

George Scherr Co., Inc.; 601

Service Diamond Tool Co.; 719

The Sheffield Corp.; 710

The L. S. Starrett Co.; 833

Steel City Testing Machines, Inc.; 611

Tubular Micrometer Co.; 707

Wilson Mechanical Instrument div., American Chain & Cable Co., Inc.; 1126

Instruments, electrical

The Bristol Co.; 311

The Bruch Development Co.; 821

Hanchett Magna-Lock Corp.; 645

Martindale Electric Co.; 1212

Merz Engineering, Inc.; 804

The Sheffield Corp.; 710

Jigs & Fixtures

Jergens Tool Specialty Co.; 350

Merz Engineering, Inc.; 804

Turner Bros., Inc.; 1316

Vlier Mfg. Co.; 321

N. A. Woodworth Co.; 1323

Keys

Allen Mfg. Co.; 116

The Bristol Co.; 311

Jergens Tool Specialty Co.; 350

Standard Pressed Steel Co.; 1535

Vlier Mfg. Co.; 321

Lamps

Dazor Mfg. Corp.; 845

Enco Mfg. Co.; 610

Lathes

Atlas Press Co.; 1510

British Industries Corp.; 1205

Eric R. Bachmann; 1817

Columbia Export Co.; 1909

Cosa Corp.; 1750

Guthery Machine Tool Corp.; 1827

H. E. B. Machine Tools, Inc.; 1800

Hammond Machinery Builders; 1628

Hardinge Bros., Inc.; 1516

Klingelhofer Machine Tool Co.; 2000

Logan Engineering Co.; 1130

M. B. I. Export & Import Ltd.; 2025

Products Index . . .

Morey Machinery Co., Inc.; 1250
Kurt Orban Co., Inc.; 1000
Perrish Steel Products, Inc.; 1034
Sheldon Machine Co.; 1408
South Bend Lathe Works; 1216
The Standard Electric Tool Co.; 1727
Stokvis, Edera & Co., Inc.; 1028
Viking Industries; 1208

Lathes, turret

British Industries Corp.; 1205
Columbia Export Co.; 1909
Cosa Corp.; 1750
de Castro & Associates; 1904
Guthery Machine Tool Corp.; 1827
Logan Engineering Co.; 1130

Lathe accessories

Globe Heat-Seal, Inc.; 1809
Master Mfg. Co.; 205
Micro-Lathe Plate, Inc.; 309
South Bend Lathe Works; 1216
M. Paul Wahlund Mechanical Laboratory; 543

Lubricants

The Alpha Corp.; 706
F. E. Anderson Oil Co.; 1309
Cities Service Oil Co.; 346
S. C. Johnson & Son, Inc.; 104
Metal Lubricants Co.; 1811
Oakite Products, Inc.; 132
Petroleum Advisers, Inc., Cities Service Oil Co.; 346
Shell Oil Co.; 112
D. A. Stuart Oil Co., Ltd.; 1823
The Texas Co.; 246

Lubrication equipment

Alemite div., Stewart-Warner Corp.; 204
The Aro Equipment Corp.; 1810
Bijur Lubricating Corp.; 641
W. R. Carnes Co.; 137
de Castro & Associates; 1904
Graymills Corp.; 224
Honan-Crane Corp.—Houdaille-Hershey Corp.; 1716

Machine table accessories

Benchmaster Mfg. Co.; 1805
Ettec Tool Co.; 1243
Green Instrument Co., Inc.; 805
F. T. Griswold Mfg. Co.; 832
Index Machine Co.; 148
Marvin Machine Products, Inc.; 1019
Micro-Lathe Plate, Inc.; 309
Precision Detroit Co.; 1713
Turner Bros., Inc.; 1316
Versa-Mil Co.; 1942
Viking Industries; 1208

Machine tool accessories and attachments

American Machine & Foundry Co.; 1131
Bokum Tool Co., Inc.; 121
Chicago Tool & Engineering Co.; 310
Cosa Corp.; 1750

Dilley Mfg. Co.; 243
Eastern Sales Co.; 1816
Everede Tool Co.; 1012
Globe Heat-Seal, Inc.; 1809
Green Instrument Co., Inc.; 805
H. E. B. Machine Tools, Inc.; 1800
Index Machine Co.; 148
Jergens Tool Specialty Co.; 350
Lapeer Mfg. Co.; 325
Master Mfg. Co.; 205
McCrosky Tool Corp.; 1227
Niagara Machine & Tool Works; 1313
Pioneer Tool & Engineering Co.; 547
Precision Detroit Co.; 1713
Proconier Safety Chuck Co.; 1624
R and L Tools; 408
The Ready Tool Co.; 1017
H. B. Rouse & Co.; 1938
Salvo Tool & Engineering Co.; 352
Scully-Jones & Co.; 1511
Seibert & Sons, Inc.; 440

Magnets

Carboloy Dept., General Electric Co.; 539
Crucible Steel Co. of America; 1401

Mandrels

Erickson Tools div., Erickson Steel Co.; 1127
Field Abrasive Specialty Mfg. Co.; 312
Willey's Carbide Tool Co.; 635

Marking machines

Cadillac Stamp Co.; 853
Colonial Broach Co.; 1201
Jas. H. Matthews & Co.; 1318

Materials handling equipment

Chicago Tramrail Co.; 218
Hansford Mfg. Corp.; 150
Manufacturing Research Dept., International Harvester Co.; 615
Special Engineering Service, Inc.; 1142
Standard Pressed Steel Co.; 1535

Metal disintegrators

Electro Arc Mfg. Co.; 100
Elox Corp.; 318
Warner div., Clinton Machine Co.; 550

Metal stitchers

Acme Steel Products div., Acme Steel Co.; 1226

Milling machines

American SIP Corp.; 1917
Atlas Press Co.; 1510
Eric R. Bachmann; 1817
Benchmaster Mfg. Co.; 1805
British Industries Corp.; 1205
Columbia Enterprises, Inc.; 341
Columbia Export Co., Inc.; 1909
Cosa Corp.; 1750
Graham Machine Tool Co.; 1911
Index Machine Co.; 148

Milling machines, cont.

Johansson & Windle Co.; 1840
Klingelhoefer Machine Tool Co.; 2000
M. B. I. Export & Import, Ltd.; 2025
Morey Machinery Co., Inc.; 1250
Kurt Orban Co., Inc.; 1000
Perrish Steel Products, Inc.; 1034
Sheldon Machine Co., Inc.; 1408
Stokvis, Edera & Co., Inc.; 1028
Viking Industries; 1208

Motors, air

The Bellows Co.; 1424

Motors, electric

Doerr Electric Corp.; 208

Motors, hydraulic

Gerotor May Corp.; 1801

Nut runners

Cleco div., Reed Roller Bit Co.; 413
Detroit Power Screwdriver Co.; 140
Garvin Brothers, Inc.; 429
Ingersoll-Rand Co.; 1639

Ovens

Connors & Davis Sales Corp.; 215

Packing

Crane Packing Co.; 1908
The Garlock Packing Co.; 105

Paper, photographic

Charles Bruning Co., Inc.; 746
Eugene Dietzgen Co.; 332

Paper, wrapping and packaging

Angier Corp.; 141

Plastics

Dayton Rogers Mfg. Co.; 1843
Parkwood Laminates, Inc.; 238

Plate and sheet working machinery

American Pullmax Co., Inc.; 1943
Connors & Davis Sales Corp.; 215
Niagara Machine & Tool Works; 1313
O'Neill-Irwin Mfg. Co.; 1338
J. A. Richards Co.; 421
Wales-Strippit Corp.; 1412

Plating equipment

Industrial Chrome div., Ward Leonard Electric Co.; 139

Polishing and finishing machines

Crane Packing Co.; 1908
Hammond Machinery Builders, Inc.; 1628
The Standard Electrical Tool Co.; 727
Vonnegot Moulder Corp.; 400

Presses

Benchmark Mfg. Co.; 1805
Dake Engine Co.; 1019

de Castro & Associates; 1904

Hercules Presses, Ltd.; 1031

M. B. I. Export & Import, Ltd.; 2025

Morey Machinery Co., Inc.; 1250

Sales Service Machine Tool Co.; 1621

V & O Press Co. div., Emhart Mfg. Co.; 1331

Verson Allsteel Press; 2031

Wales-Strippit Corp.; 1412

Wiedemann Machine Co.; 1915

Presses, hydraulic

Dake Engine Co.; 1019

Flannifin Corp.; 1609

Verson Allsteel Press; 2031

Publications

Acme School of Die Design Engineering; 644

American Machinist Magazine; 632

Automotive Industries Magazine; 800

Foundry; 546

Hitchcock Publishing Co.; 418

The Iron Age; 800

Machine Design; 546

Machine & Tool Blue Book; 418

Machinery; 846

McGraw-Hill Book Co.; 632

Mill & Factory Magazine; 152

Modern Machine Shop; 651

New Equipment Digest; 546

Penton Publishing Co.; 546

Production Engineering & Management; 220

Steel; 546

The Tool Engineer; 500

Tooling & Production; 339

Pumps

Brown & Sharpe Mfg. Co.; 1435

Delta Power Tool div., Rockwell Mfg. Co.; 209

Graymills Corp.; 224

Ingersoll-Rand Co.; 1639

Logansport Machine Co., Inc.; 1529

Pioneer Pump & Mfg. Co.; 1528

Racine Tool & Machine Co.; 432

Tuthill Pump Co.; 2029

The Weldon Tool Co.; 305

Pumps, hydraulic

Gerotor May Corp.; 1801

Rivett Lathe & Grinder, Inc.; 1027

Superdraulic Corp.; 849

Tuthill Pump Co.; 2029

Punches

Accurate Bushing Co.; 838

Ace Drill Corp.; 144

Ampco Metal, Inc.; 1119

Durable Punch & Die Co.; 214

National Machine Tool Co.; 232

Pivot Punch & Die Corp.; 343

Porter Precision Products; 1830

Producto Machine Co.; 1104

Richard Bros. div., Allied Products Corp.; 225

Products Index . . .

Reamers

Ace Drill Corp.; 144
 Arrow Tool & Reamer Co.; 117
 The Atrax Co.; 1722
 Circular Tool Co., Inc.; 634
 Gammons-Hoaglund Co.; 1231
 The Charles L. Jarvis Co.; 1534
 Eric S. Johnson Co.; 111
 K. O. Lee Co.; 347
 Masterform Tool Co.; 109
 McCrosky Tool Corp.; 1227
 Nelco Tool Co., Inc.; 410
 Pratt & Whitney div., Niles-Bement-Pond Co.; 512
 Putnam Tool Co.; 439
 Severance Tool Industries, Inc.; 414
 Staplès Tool Co.; 639
 Super Tool Co.; 1429
 Wetmore Reamer Co.; 747
 Willey's Carbide Tool Co.; 635

Recess tools

Davis Boring Tool div., Giddings & Lewis Machine Tool Co.; 1705
 Masterform Tool Co.; 109
 R and L Tools; 408
 Scully-Jones & Co.; 1511

Refrigerating equipment

Industrial div., Webber Appliance Co., Inc.; 241
 Manufacturing Research Dept., International Harvester Co.; 615
 Progressive Welder Sales Co.; 437
 Sub-Zero Products, Deepfreeze Distributing Corp.; 337

Reproduction equipment

Anderson & Sons, Inc.; 834
 Eugene Dietzgen Co.; 332

Riveters

Chicago Pneumatic Tool Co.; 425
 Cleco div., Reed Roller Bit Co.; 413
 Hannifin Corp.; 1609
 Milford Rivet & Machine Co.; 2004
 The Tomkins-Johnson Co.; 1927
 Tubular Rivet & Stud Co.; 317

Rolls

J. G. Jergens Co.; 743
 Kennemetal, Inc.; 1723
 Metal Carbides Corp.; 739

Rotary burs and Files

The Atrax Co.; 1722
 Martindale Electric Co.; 1212
 Nicholson File Co.; 745

Rust preventives

Angier Corp.; 141
 Oakite Products, Inc.; 132
 Parker Rust Proof Co.; 247
 Shell Oil Co.; 112

Safety equipment

Dilley Mfg. Co.; 243

Saws, band

Boice-Crane Co.; 136
 Delta Power Tool div., Rockwell Mfg. Co.; 209
 The DoAll Co.; 1634
 Machine Tool div., Kalamazoo Tank & Silo Co.; 1023
 The L. S. Starrett Co.; 833

Saw blades

The Allison Co.; 1204
 The DoAll Co.; 1634
 Nelco Tool Co., Inc.; 410

Saw blades, hack

The Capewell Mfg. Co.; 2027
 The DoAll Co.; 1634
 The L. S. Starrett Co.; 833

Saws, metalworking

Circular Tool Co., Inc.; 634
 The DoAll Co.; 1634
 Martindale Electric Co.; 1212
 Sales Service Machine Tool Co.; 1621
 Stone Machinery Co., Inc.; 447
 Walker-Turner div., Kearney & Trecker Corp.; 1905

Scales

Hydroway Scales, Inc.; 108

Scales, machinist's

Anderson & Sons, Inc.; 834
 The Lufkin Rule Co.; 809
 The L. S. Starrett Co.; 833

Screws

Allen Mfg. Co.; 116
 The Bristol Co.; 311
 Danly Machine Specialties, Inc.; 1610
 Jergens Tool Specialty Co.; 350
 Morton Machine Works; 1015
 Standard Pressed Steel Co.; 1535
 Edwin B. Stimpson Co., Inc.; 1139
 Strong, Carlisle & Hammond Co.; 844
 Vlier Mfg. Co.; 321

Screws, cap and set

Allen Mfg. Co.; 116
 The Bristol Co.; 311
 Danly Machine Specialties, Inc.; 1610
 Standard Pressed Steel Co.; 1535
 Strong, Carlisle & Hammond Co.; 844

Screw machines, automatic

Eric R. Bachmann; 1817
 Columbia Export Co., Inc.; 1909
 Cosa Corp.; 1750
 Guthery Machine Tool Corp.; 1827
 Alfred Hofmann Needle Works, Inc.; 1715

Screw machine accessories

Boyar-Schultz Corp.; 1438
 Brown & Sharpe Mfg. Co.; 1435
 Eastern Sales Co.; 1816
 Sutton Tool Co.; 420
 The Weldon Tool Co.; 305

Screw thread inserts

Heli-Coil Corp.; 316

Sealants and sealing compounds

Crane Packing Co.; 1908

Separators, magnetic coolant

Barnes Drill Co.; 1808

Hanchett Magna-Lock Corp.; 645

Shapers

Atlas Press Co.; 1510

British Industries Corp.; 1205

Cosa Corp.; 1750

Delta Power Tool div., Rockwell Mfg. Co.; 209

Graham Machine Tool Co.; 1911

Klingelhofer Machine Tool Co.; 2000

Kurt Orban Co., Inc.; 1000

Rowe Machinery & Mfg. Co., Inc.; 336

Sales Service Machine Tool Co.; 1621

Sheldon Machine Co., Inc.; 1408

South Bend Lathe Works; 1216

Stokvis, Edera & Co., Inc.; 1028

Shears

National Machine Tool Co.; 232

Niagara Machine & Tool Works; 1313

O'Neil-Irwin Mfg. Co.; 1338

Stamping machines

Verson Allsteel Press; 2031

Steel, alloy

Allegheny Ludlum Steel Corp.; 1218

Crucible Steel Co. of America; 1401

Detroit Stamping Co.; 115

Industrial Tectonics, Inc.; 315

Latrobe Electric Steel Co.; 1732

Manufacturing Research Dept., International Harvester Co.; 615

A. Milne & Co.; 120

Size Control Co.; 704

Universal Cyclops Steel Corp.; 520

Steel, tool and die

Ace Drill Corp.; 144

Allegheny Ludlum Steel Corp.; 1218

Ampco Metal, Inc.; 1119

Brown & Sharpe Mfg. Co.; 1435

The Capewell Mfg. Co.; 2027

Crucible Steel Co. of America; 1401

The DoAll Co.; 1634

Firth Sterling Steel & Carbide Corp.; 725

Latrobe Electric Steel Co.; 1732

A. Milne & Co.; 120

Joseph T. Ryerson & Son, Inc.; 147

Size Control Co.; 704

The L. S. Starrett Co.; 833

Universal-Cyclops Steel Corp.; 520

Vanadium-Alloys Steel Co.; 536

Surface plates

Acme Tool Co.; 128

Collins Micro-Flat Co.; 608

Delta Power Tool div., Rockwell Mfg. Co.; 209

Herman Stone Co.; 814

Rahn Granite Surface Plate Co.; 603

South Bend Lathe Works; 1216

Switches, electrical

The Arrow Hart & Hegeman Electric Co.; 2042

Micro Switch div., Minneapolis-Honeywell Regulator Co.; 416

Tapping heads

Burg Tool Mfg. Co.; 1113

Ettco Tool Co.; 1243

The Charles L. Jarvis Co.; 1534

The Wickman Mfg. Co.; 1105

Tapping machines

Beckett-Harcum Co.; 1116

Burg Tool Mfg. Co.; 1113

Cleveland Tapping Machine Co.; 300

Commander Mfg. Co.; 1238

Ettco Tool Co.; 1243

Govro-Nelson Co.; 119

Kaufman Mfg. Co.; 1926

Proconier Safety Chuck Co.; 1624

Producto Machine Co.; 1104

Threading machines

Bokum Tool Co., Inc.; 121

The Capewell Mfg. Co.; 2027

Guthery Machine Tool Corp.; 1827

Jones & Lamson Machine Co.; 1411

Kaufman Mfg. Co.; 1926

The Lees-Bradner Co.; 2030

Tips, carbide

Adamas Carbide Corp.; 1301

Carboloy Dept., General Electric Co.; 539

Wetmore Reamer Co.; 747

Willey's Carbide Tool Co.; 635

Tool bits

Armstrong Brothers Tool Co.; 133

The Atrax Co.; 1722

Black Drill Co.; 446

Dow Mechanical Corp.; 711

Tool holders

Acme Tool Co.; 128

Armstrong Brothers Tool Co.; 133

Beaver Tool & Engineering Corp.; 1219

Bokum Tool Co., Inc.; 121

Burg Tool Mfg. Co.; 1113

Eastern Machine Screw Corp.; 450

Eclipse Counterbore Co.; 526

Enco Mfg. Co.; 610

Erickson Tools div., Erickson Steel Co.; 1127

Errington Mechanical Laboratory, Inc.; 212

Gairing Tool Co.; 738

Eric S. Johnson Co.; 111

National Broach & Machine Co.; 1022

Tool holders, cont.

R and L Tools; 408
The Ready Tool Co.; 1017
Scully-Jones & Co.; 1511
Waukesha Tool Co.; 643
The Weldon Tool Co.; 305
Wesson Co.; 646

Toolroom accessories

Armstrong Brothers Tool Co.; 133
The Capewell Mfg. Co.; 2027
Detroit Stamping Co.; 115
Globe Heat-Seal, Inc.; 1809
J & S Tool Co., Inc.; 1922
Jergens Tool Specialty Co.; 350
Lapeer Mfg. Co.; 325
Morton Machine Works; 1015
Nicholson File Co.; 745
Scully-Jones & Co.; 1511
South Bend Lathe Works; 1216
Taft-Peirce Mfg. Co.; 624
Utica Drop Forge & Tool Corp.; 221
Vlier Mfg. Co.; 321
Waldes Kohinoor, Inc.; 751
West Point Mfg. Co.; 240

Turrets

Enco Mfg. Co.; 610
Globe Heat-Seal, Inc.; 1809

Valves, air

Beckett-Harcum Co.; 1116
Detroit Stamping Co.; 115
Hanna Engineering Works; 1625
Hannifin Corp.; 1609
Industrial Air Controls div., Bendix-Westinghouse Automotive Air Brake Co.; 1717
Lindberg Engineering Co.; 1333
Mechanical Air Controls; 2012
Modernair Corp.; 412
Nopak div., Galland-Henning Mfg. Co.; 1804
Ortman-Miller Machine Co., Inc.; 2017
Rivett Lathe & Grinder Co., Inc.; 1027
Ross Operating Valve Co.; 2026
A. Schrader's Son div., Scoville Mfg. Co., Inc.; 433
The Tomkins-Johnson Co.; 1927

Valves, hydraulic

Beckett-Harcum Co.; 1116
Hanna Engineering Works; 1625
Hannifin Corp.; 1609
Lindberg Engineering Co.; 1333
Modernair Corp.; 412
Nopak div., Galland-Henning Mfg. Co.; 1804
Ortman-Miller Machine Co., Inc.; 2017
Racine Tool & Machine Co.; 432
Rivett Lathe & Grinder Co.; 1027
Ross Operating Valve Co.; 2026
Superdraulic Corp.; 849
The Tomkins-Johnson Co.; 1927

Vibration control

The Korfund Co., Inc.; 1011

Vises

American Machine & Foundry Co.; 1131
Benchmark Mfg. Co.; 1805
Brown & Sharpe Mfg. Co.; 1435
Chicago Tool & Engineering Co.; 310
Hammond Machinery Builders, Inc.; 1628
Hanchett Magna-Lock Corp.; 645
J & S Tool Co., Inc.; 1922
National Machine Tool Co.; 232
Producto Machine Co.; 1104
Wesson Co.; 646
Wilton Tool Mfg. Co.; 237

Wear parts

Adamas Carbide Corp.; 1301
Allegheny Ludlum Steel Corp.; 1218
Ampco Metal, Inc.; 1119
Kennametal, Inc.; 1723

Welding electrodes

Ampco Metal, Inc.; 1119

Wire straightening machines

American Pullmax Co., Inc.; 1943
Delta Power Tool div., Rockwell Mfg. Co.; 209
Rowe Machinery & Mfg. Co., Inc.; 336

Wire strippers

Ideal Products, Inc.; 642

Wrapping machines

Angier Corp.; 141

Part III

A Blueprint for a Tool Engineering Organization 96

**Influence of the Tool Engineer on Machine Tool Design
By Nevin L. Bean 102**

**Tool Engineering as an Investment
By Robert T. Kimmel . . 106**

**A Thesis on Production Planning
By Robert L. Fleming . . . 110**

**A *Tool Engineer* Study of Tooling Practice and Methods
in Tooling and Production During the Forthcoming
Biennium**

- | | | |
|-----------------------|------------------------------|-----|
| 1. Machine Tools | By Ben D. Smith | 114 |
| 2. Assembly Tooling | By John Starr | 117 |
| 3. Materials Handling | By A. F. Murray | 123 |
| 4. Metal Cutting | By A. O. Schmidt | 126 |
| 5. Tool Materials | By Lester F. Spencer | 129 |

A Blueprint for a Tool Engineering Organization

MODERN MANUFACTURING in the mass production industries demands a complexity of functions in its engineering phases. The tool engineering phase has grown in complexity with the physical volume of tooling and equipment which has become characteristic of production in the mass production industries.

Thus many of the functions formerly held by varying, and sometimes opposing segments of the manufacturing organization are combined, in the modern industrial plant, within a fully-developed tool engineering organization.

As an example, consider the development of a new product yet in the design stages. Prototypes have been built and tested; the function of the product is sound from an engineering standpoint. Even at this stage many costly manufacturing operations are indicated or tentatively committed, and it is at this stage that effective tool engineering must take over.

It is these drawings which reach the executive tool engineer for processing and it is here that the first function of this department is manifest and here the first departure from accepted routine takes place. Under ordinary circumstances the drawings from the product engineering department are accepted and processed as separate parts without regard for the end use. Tool engineering functions automatically as to fixtures only and as a result the final product in most cases suffers in quality and quality control, and often necessitates the purchase of additional expensive equipment, even at times voiding a large portion of the original set-up.

This condition may exist to such an extent as to jeopardize the success of the venture. This has long been the bane of the tool engineering department

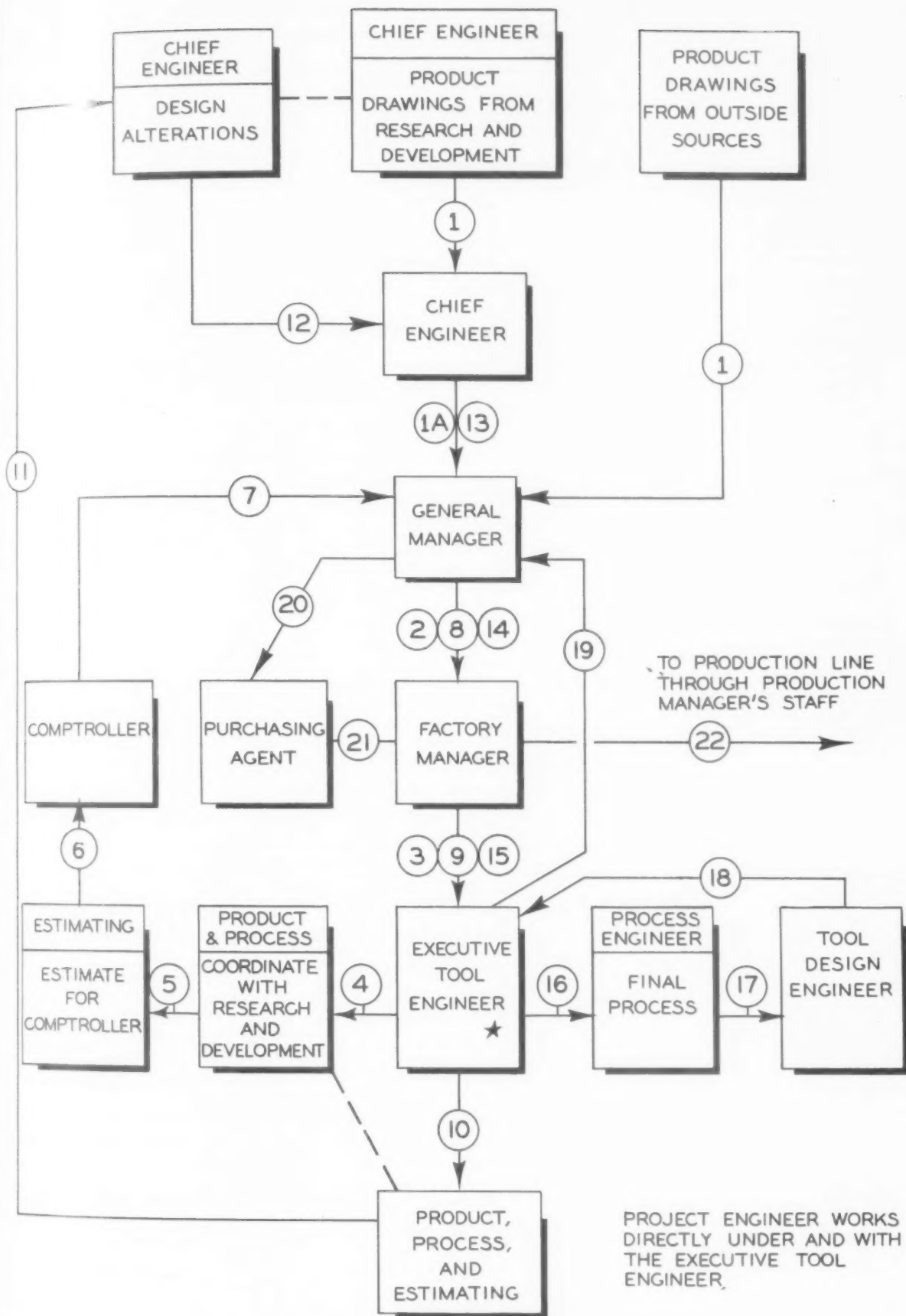
and it has often been said relative to the part being processed: Why does this have to be done? or If it could be done that way—. Many manufacturers have recognized this condition and now send the end product drawings as a package to tool engineering for a thorough policing of the entire program.

As a result of this method, thousands of dollars can be and are saved and costly delays and tie-ups eliminated. Preliminary processing is inaugurated from both production methods and cost analysis, often by comparison with the original details as submitted. Changes are recommended to eliminate the necessity of costly machine tool purchases and parts, while retaining functional correctness, are altered to increase machinability.

In the normal course of events, the end product starts in the research and development department (which in this case represents all the functions under the chief engineer) and flows through the chief engineer's office to the general manager's staff. However, there is another source of product design outside of the chief engineer's staff. Often it is from a source outside the entire organization. This is especially true in times of national emergency when a product will be farmed out to a normally rival organization due to security commitments, or to save capital equipment expenditures.

It is this outside product that calls for the full scope of the executive tool engineer's staff's facilities, because this product, as the chart shows in Chart I, will flow from the general manager's staff to the factory manager to the production engineer. The first step at this point is a preliminary processing coupled with an estimate for the comptroller.

In this preliminary processing, the part is analyzed from all angles and often suggestions for

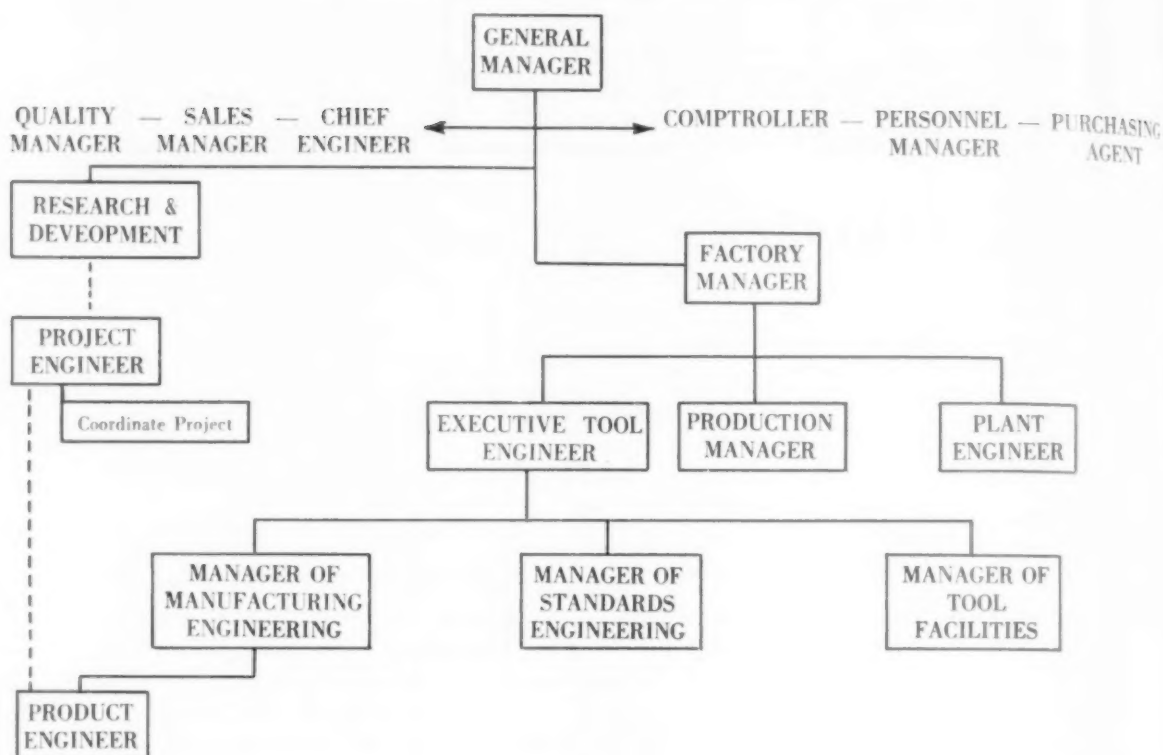


PROJECT ENGINEER WORKS DIRECTLY UNDER AND WITH THE EXECUTIVE TOOL ENGINEER.

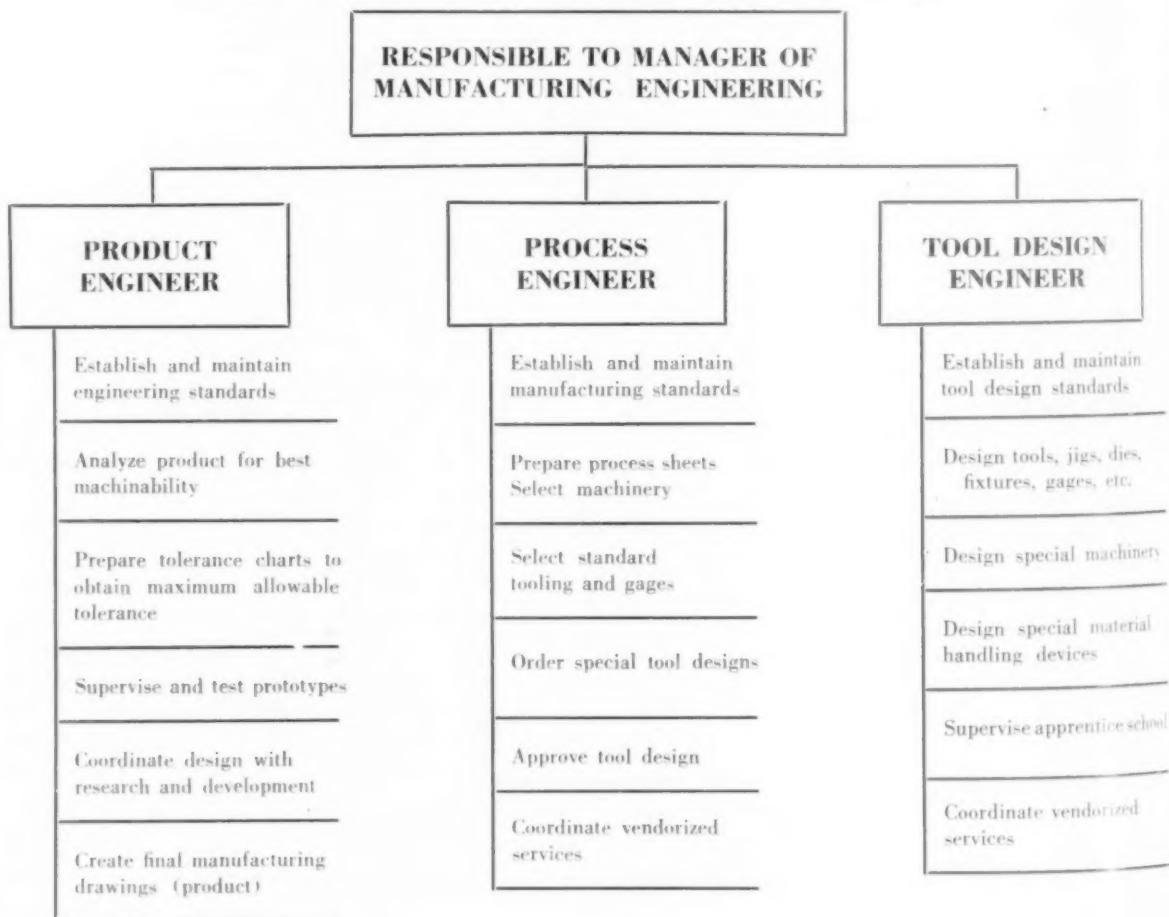
FUNCTIONAL FLOW CHART

FOLLOW DESIGN MOVEMENT IN NUMERICAL ORDER

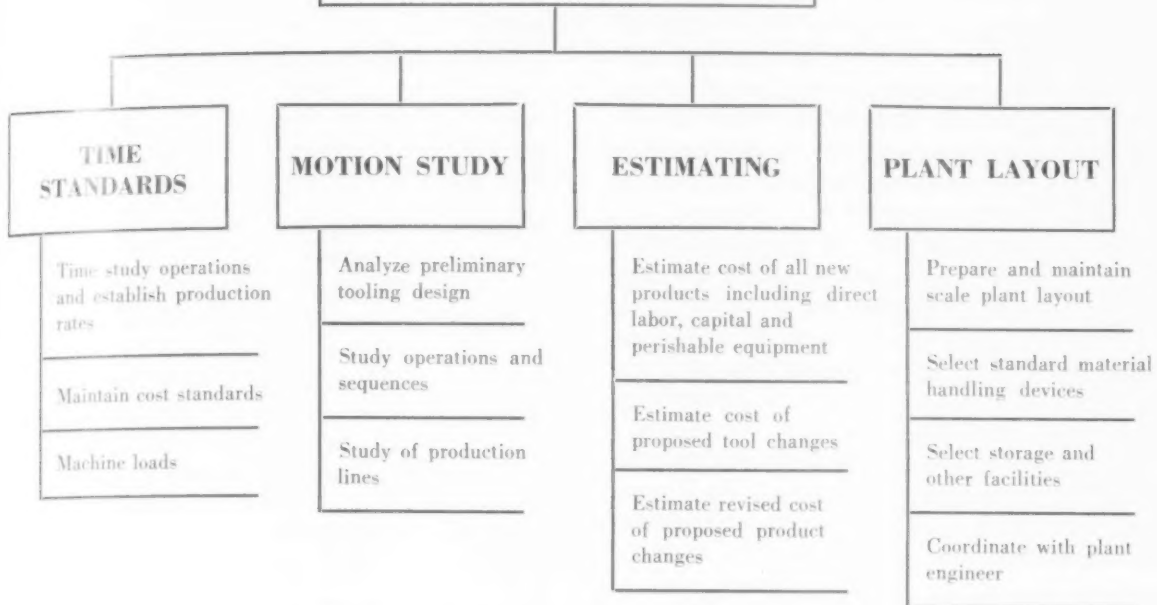
General organization of tool engineering activities in a medium-to-large industrial organization



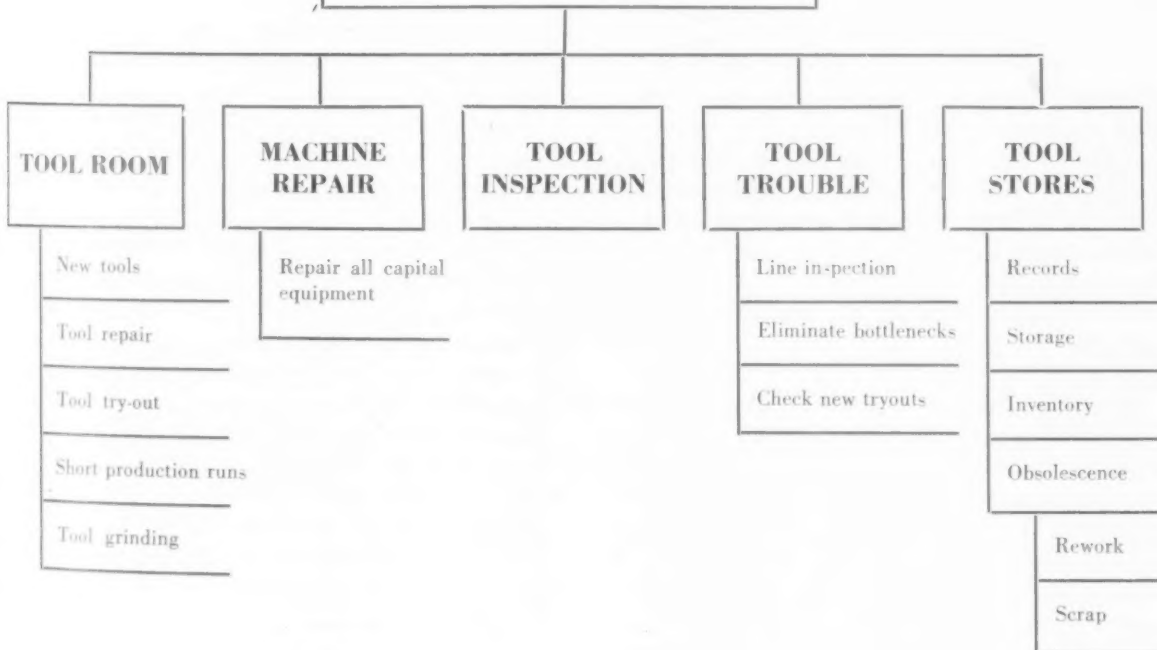
Functional operations are carried on under supervision of the staff and department heads organized under three managers.



**RESPONSIBLE TO MANAGER OF
STANDARDS ENGINEERING**



**RESPONSIBLE TO MANAGER OF
TOOL FACILITIES**



better product design are incorporated, sometimes to meet the range of the existing production lines but more often to eliminate the acquisition of critical machine tools. For this reason, the present day executive tool engineer must not only fulfill his normal function but he must also have qualified men on his staff who are product and special machine designers.

This makes his position in the industrial picture of prime importance, and even in captive product design, he must exercise his policing policy to insure a better end product. Without this preliminary processing and the estimate for the comptroller, many programs would be doomed to financial failure at their very inception.

This is the new function of the executive tool engineer and his department: new in the sense that while it has been in existence for some time, it has not been recognized nor admitted in most organizations. It is, however, better that it be brought to the attention of the departments involved and recognized as an accomplished fact.

His staff consists of a manager of manufacturing engineering, a manager of standards engineering and a manager of tool facilities. The functions of these men are as follows. See Chart II.

Manager of Manufacturing Engineering

His staff consists of the product engineer, the process engineer and the tool design engineer and he is directly responsible to the executive tool engineer and must work closely with the managers of standards engineering and tool facilities. Under his direction is all engineering pertaining to the end product except that done by research and development.

The project engineer establishes and maintains all engineering standards or methods; prepares charts to obtain the maximum allowable tolerances justified by the design, thus maintaining lowest manufacturing costs and greatest flexibility in assembly; supervises building and testing of prototypes and analyzes same to obtain maximum machinability; coordinates design through project engineer with research and development and creates final product manufacturing drawings. He is responsible to the manager of manufacturing engineering and works in close harmony with the process engineering department. He is supervised by the chief product engineer.

The process engineer establishes and maintains all manufacturing standards and prepares all process methods; selects additional new machinery in proper relation to existing equipment and/or other new equipment; selects proper standard tools and gages and orders all sub-contracted items in conjunction with the tool design department and procures necessary deliveries. He is responsible to the manager of manufacturing engineering and is supervised by the chief process engineer.

The tool design engineer establishes and maintains tool design standards and designs all tools, jigs, dies, fixtures, gages, etc. on order from the process engineering department. He designs or supervises design of all special machinery and special material handling devices and in conjunction with process engineering, coordinates sub-contracted activities. He supervises the apprentice training school for tool design drafting. He is responsible directly to the manager of manufacturing engineering and obtains all data and information through his staff from product and process engineering. The chief tool design engineer is in charge.

Manager of Standards Engineering

This man is responsible for all time standards, motion study, estimating and plant layout projects, both preliminary and final, to the executive tool engineer. He must work closely with the manager of manufacturing engineering and the plant engineer and integrate his work with the various departments under these two divisions.

He has four main departments responsible to him and which he must operate in cooperation with each other. In some cases personnel in these departments may change functions to suit the needs of the moment. Viz, time standards may lend personnel to estimating, motion study to plant layout, etc. as the occasion warrants.

The time standards department will study and set up time allowances for each operation in preliminary stages and check with the actual time after instructing operators; will establish preliminary and record actual machine loads. Maintenance of cost standards, coordination with motion study, and operation under time study engineer, who may also be supervisor of motion study, are also included.

Motion Study: Analyze preliminary and final tooling design and check for ease of operation. Study operational sequences and material flow and handling. Survey entire production line and recommend through proper channels all changes necessary to eliminate or minimize loss of time in setting up, loading, operating, unloading work and removing and replacing fixtures. Sometimes works under supervisor of time standards but usually under own supervisor.

Estimating: Estimate cost of all new products in relation to existing equipment; decide which parts shall be sub-contracted and stages of tooling required, finished or semi-finished; establish direct and indirect labor, capital and perishable tool costs; make comparative estimates of present tooling and proposed changes. Has own supervisor but may lend or borrow personnel from allied departments under standards engineering.

Plant layout prepares and maintains a scale plant layout and constantly watches for and controls violations of building and/or insurance regulations.

It selects material handling devices, conveyors and storage facilities, and operates closely with the plant engineer's office for movement and placement of machines and equipment. It is supervised by the plant layout engineer who is part of the staff of the manager of standards engineering.

Manager of Tool Facilities

The manager of tool facilities reports directly to the executive tool engineer and is responsible to him for all physical facilities under him. Unlike the managers of manufacturing and standards engineering who deal with drawings and paper work before the production equipment is built, the manager of tool facilities deal with the actual equipment before, during and after production use.

He has five main departments under him, each of which is headed by a foreman. These departments are the tool room, tool inspection, tool trouble, machine repair and tool stores, and the functions of these departments are listed below.

Tool Room: It has been found through experience that it is cheaper to have new tools sub-contracted to outside shops for building and to maintain the tool room for necessary service work to keep existing tools and equipment in first class working order. A few new tools may be built but only to provide work when there is a lull in repair work. The bulk of the work consists of tool repair and alterations and the subsequent tool tryout. It is also the duty of the tool room to conduct new tool and machine tool tryouts. Also, short production runs are handled to eliminate upsetting the production lines. Such runs are usually of parts for special units or for parts that are incompletely toolled.

A most important phase of tool room service is tool grinding. This may even be a separate department if the work warrants, but it must work in close harmony with the tool room. All service tools for production are maintained and an adequate inventory of tools and tool condition is kept at all times either directly in this department or in conjunction with tool stores.

The location of the tool room is not important if it is easily accessible. It is supervised by a foreman responsible to the manager of tool facilities.

Tool Inspection: Inspects all new and reworked tools against the drawings. Works in close harmony with the tool room and is usually located in part of the tool room building but is under a separate foreman or chief tool inspector who reports directly to the manager of tool facilities.

Tool troubles: The liaison group between the production line and the tool facilities group. It is responsible for production line inspection of tool and fixture use. It checks new set-ups in the production line and watches for bottlenecks. It works closely with production department inspectors and

is usually called into action by them; it works directly under and is responsible to the manager of tool facilities and may work as individual persons assigned to certain sections of the production line or they may work under direction of a chief trouble shooter on spot assignments as trouble occurs.

Machine Repair: Repair of or alteration to capital equipment. May sometimes repair or alter large dies and fixtures. Is not concerned with service equipment such as generators, dynamos, boilers, conveyors, etc. but only with production machinery. Does not move equipment but accepts it from and returns it to the plant engineer's housekeeping unit.

Tool Stores: The functions of tool stores is to record and store jigs, fixtures, dies and tools in a manner that will permit instant access.

Heavy items such as large fixtures or dies must, of necessity, be stored on an aisle of sufficient size to accommodate a lift truck, whereas small tools such as 1/4-in. taps could be stored in drawer-type cabinets on an aisle only 18 in. wide.

This department should maintain records of each item to be stored. Record cards should carry the tool name, tool number in the case of special tools, tool size on standard tools, bin or location number, the part number on which tools are used, the quantity to be stocked, the dates of receipts and disbursements, together with quantities and a perpetual inventory of items on hand.

Tool stores shall requisition from the purchasing department the necessary quantities required to keep inventories up to date. The only exception to this is the initial requisition made by the process engineer who orders enough items to start the job through production.

An engineering change may obsolete one or more tools. Whenever this occurs, tool stores is advised by a memo to send all tools affected to obsolete tool storage for a decision as to whether they are to be re-worked or sold as scrap.

The Flow Chart

As mentioned before, there are two sources of product drawings, those from the research and development and those from an outside source. The former are made under the supervision of the chief engineer and are routed to the general manager's office and staff. The latter are made entirely outside the plant and enter directly into the general manager's office. From here on both types of product drawings are handled alike. See Chart I.

From the general manager's office the material flows to the factory manager and through his staff to the executive tool engineer where it is delegated to a project engineer (contact man) who ties the whole program together from here until completion and delivery to either the production manager or back to the outside source.

(Continued on page 122)

Influence of the Tool Engineer on Machine Tool Design

By **Nevin L. Bean**

ASSISTANT TO THE VICE PRESIDENT, MANUFACTURING
FORD MOTOR COMPANY

AT THE TURN of the century, industry was not so diversified that there was any need for labels for the various branches of engineering. The engineer who had an idea had no need for consultation with specialists in other fields. At that time the engineer carried out his own ideas from visualization through the construction of the prototype or working model.

He forged his stock. He turned and machined his details. He heat-treated shafts, blocks, tools and many other parts that required hardening. He learned to fit mating parts so that as units, they worked smoothly, but he seldom considered a dimensional standard. If and when he needed a replacement, he merely fit the replacing part to the mating part already existing. Mass production was unheard of. The most commonly mass-produced parts were made of wood, such as wagon wheel spokes, barrel staves, chair legs, and most of these were produced by using visual standards.

The Railroad Shop nested many lesser creatures who later grew into mechanical giants. Many of our top automotive wizards came up through the Railroad Shop.

Their training was good, but the pay was meager. This training period was known as apprenticeship, a word rapidly being forgotten. Rates of pay may have varied from zero to 12 cents per hour with from $1\frac{1}{2}$ to two cents per hour increase for each six months of service, this policy varying greatly in different areas and with different roads.

But in this apprenticeship period a drafting course must always be a supplemental function. Sometimes during this supplemental training, one certain young man might get the hang of the drafting business a little faster and probably with more deftness than others with whom he worked.

This quite often resulted in him being chosen to put on paper the ideas of his boss, who wanted

the ideas recorded, but was not inclined to do so, either through a lack of training or a lack of desire.

Actually, what was happening was that a tool engineer was coming into his own, though quite often he did not realize this and continued to hang onto the name of machinist or mechanic.

He probably later became a designer. He might have taken under his wing promising young men whom he taught the art of tracing. At this time, all drawings of a permanent nature were made with ink. Thus, an apprentice usually went through the stages of tracing, detailing, designing, checking and, if fortunate, might become the chief designer.

In the late 90's and early 1900's, many companies were developing a standard line of machine tools and attachments. At the same time, American competition and free enterprise were stimulating better and more efficient products.

The automotive industry was supplying the greatest impetus for the demand of bigger and better equipment. Cadillac, Oldsmobile, Haynes, Hudson, Chandler, Hupp, Packard, Buick and many others were starting to vie for the top spots in the American buying favor. Then came the unheard of high productions of Ford and Dodge.

The machine tools which had been successful in custom type production were now becoming inadequate under continuous and high speed usage. This resulted in a demand for better tooling. Practically all larger companies were beginning to realize the worth of full time engineers who would keep abreast or ahead of the increasing demand. Ingenious mechanisms, born of necessity, were finding their way into these new productive fields.

Ford had started the production line. They were setting a breath-taking pace in mass production. When single purpose machines could not be purchased, Ford's tool design department was given

the job design a machine to do the operation, and faster than ever done before.

The machine tool builders saw this invasion of their hitherto unmolested industry, and they set their tool designers to work to equal, if not surpass, the efforts of these private developments. The competitive spirit took hold, and the tool designers became the geniuses who were rapidly changing the customs and habits of a productive era.

Automatic screw machines, rotary multiple spindle vertical turning machines, internal and external grinders, continuous rotary multi-spindle drills and many other improved type machine tools found their way from a drawing board to materialization during the first fifteen years of the new century.

The shop man, whether foreman or workman, often had ideas that they would like to put into practice. For example, a lathe hand had difficulty loading a pre-centered piece of stock into his machine because one end was so much heavier than the other that it caused a major unbalance at loading. Invariably, the heavier end was lower than the center, while the other end was higher.

The operator thought that if he could stand the lathe on end, with the head stock down, the part to be machined could be set on the driving center and the opposite end would be easy to engage. This experiment worked beautifully, and the chips also became easier to handle. The result was that he could run two machines if they were so equipped.

This not only lessened the effort in handling by eliminating the juggling but over two parts were now produced to one previously. Not to be outdone, another craftsman made the statement that if these

up-ended lathes were put on a "merry-go-round," the operator could load and unload as they went by.

The tool designers got busy and designed a rotary unit, spindles being driven by a bull gear and the feeds cam-operated, which fulfilled the dream of the man who mentally visualized a merry-go-round loaded with up-ended lathes.

In similar instances, many other ideas became a matter of evolution, starting with a suggested idea and improved and developed progressively. Few, if any, major machine developments were spontaneous as to their being designed and constructed without experimental development.

In these earlier days, machine tools were dependent upon power from a source overhead or nearby. Motors were either placed on the floor adjacent to the machine tool or were suspended from points of vantage where power could be obtained through the medium of flat leather or canvas belts. Where multiple units of machines were grouped, usually a line shaft carrying pulleys from 6 to 40 inches in diameter were used to supply belt power to the various machines. A 40- or 50-hp motor usually powered these line shafts. Where higher and lower speed machines were to be powered from the same line shaft, it was quite often necessary to use jack-shafts to change drive shaft speeds.

In the larger machine shops, the placement of machines was difficult, and once a department had been laid out, rearrangement of one or more machines quite often involved much expense and time.

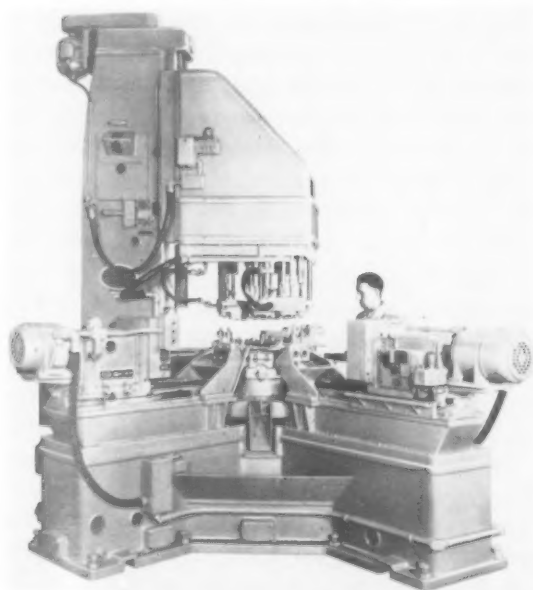
The ten modern factory buildings were constructed with channels placed face-to-face before the pouring of the concrete so that anchor slots were spaced in the ceilings, providing quick bolting facilities for hangers and pillow blocks. The conventional departmental arrangement usually placed two rows of machines back to back so they could be served from the same line shaft, even though many times belts would have to be crossed to obtain proper direction of machine shaft rotation.

Maintenance of belts and shafting presented many problems and was a continual safety hazard. Millwrights were obliged to work on ladders, leaning against revolving shafts, change and repair belts without stopping the line shafts, and oil these overhead bearings without ever cutting off the main power source. Removal of a machine from one of these areas was often a major project. Many beneficial moves were delayed or ignored because of these conditions.

Another serious handicap to the belt-driven department was the problem of lighting. These flat leather belts, many of them 6 in. wide, running at all angles, made it practically impossible to place lights without having belt shadows reflecting in some workman's line of vision.

Henry Ford was one of the first to appreci-

Fig. 1. This four-way horizontal drilling machine machines and assembles 248 refrigerator pistons per hour. These operations are carried on in six stations and include drilling, facing, reaming and chamfering.



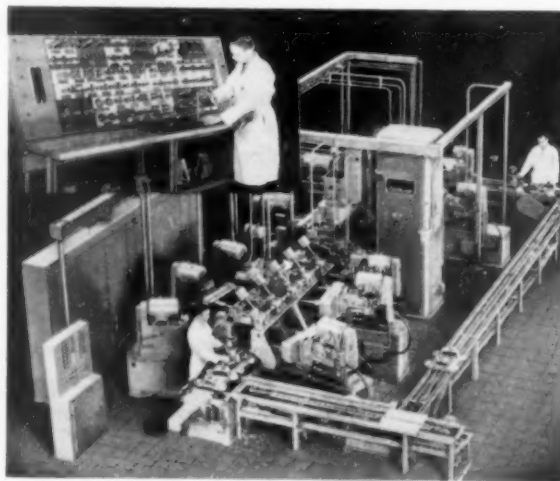
ate the negative factors in this set-up and do something about it. He issued an order that all the machine tools in his factories be independently driven, and in such a manner that if and when a move was made, electrical current could be wired to the machine and it would be running again. Of course, in some cases, foundations, coolant lines, chip chutes, etc. may be involved, but, in most cases the running of an electrical line to the machine would be the only effort to get it started after placement. Setting motors on the floor and running a belt to the machine was forbidden.

The biggest reaction to this order came from the machine tool industry. They had standardized their machine line over a period of years and had all their drawings, patterns and replacement parts made up and available. Then again, *all* large companies were not considering independent motor-driven machines, and machine tool builders could not favorably serve two channels of thought in design and construction.

In large companies, such as Ford, tool designers started to redesign adaptations to convert these machines to individual drives. Many machines required the replacement of as much as 60 percent of its total construction to adapt motor drives. This could only be accomplished through the tool design division, because standardization of these drives must insure following of a pre-planned pattern:

Some of the more complicated devices involved were Swiss precision boring machines, universal grinders, back-off mills and dozens of other machine tools of complex design. The universal grinders required the design of completely new driving heads, embodying features to permit variable speeds. One of the automobile manufacturers, pioneering the conversion to independently motor-driven machines, has been responsible for over 3000 individual designs of motor drives.

Fig. 2. The operations performed by this Transermatic on automatic transmission cases include drilling, reaming, boring and tapping 48 holes with 84 tools at 15 stations.



The tool design department was even ready to supply drawings of the adaptations so that the designs might be incorporated into new machine tools. Many machine tool companies availed themselves of this service. At first the new machine tools were equipped with the adapted drives, as designed. However, their popularity and efficiency soon warranted permanent incorporation of the drive feature which resulted in better and more pleasing appearing machine tools.

The tool designers afforded the major influence in this tremendous conversion from line shaft to independently driven machines, and the designers were kept busy meeting new demands for a rapidly changing industry. This conversion came at a time where complete advantage could be taken in this rapidly changing industry. The reason for the general change was the phenomenal growth of the auto industry. From small beginnings, these auto firms were developing into multi-million dollar corporations and needed frequent rearrangement and expansion of departments and factories.

The problem of extremely high productions kept mechanics and designers on their toes to meet the continually growing demand for more production. Single and multiple purpose machines were being designed for more and bigger production schedules. Prior to 1920, several hundred names were registered which were the trade marks of cars being driven on our streets and highways. The recession of 1920 saw many of these familiar names disappear from the new car registration lists.

Two reasons may be given for this; First: Business failures hit many of the commercially weaker concerns, and secondly: This era became known as the period of combines. Smaller companies began to merge to afford better buying and manufacturing power. This trend presented a new challenge to the designers. They had to design units that could produce more economically, and lessen the physical burden which had been placed on labor, by a lack of tooling, to meet these increased production demands. Conveyors, handling devices, hoists, chip drags and many other devices were designed and built to lessen the physical labor which was overtaxed by this comparatively new production tempo.

As one phase of design advanced, other components of production activity seemed to lag or not keep abreast with these newly improved ideas. With so much thought being given to the machines and their design, it soon became apparent that the tooling had not kept abreast. This new challenge was immediately accepted. Alloyed cutting tools, of much superior cutting value, soon hit the market, and again the tempo hit a new high. With the improved designs of cutters and cutting tools, and the advanced efficiency now offered in tool steels and alloys, a new problem became apparent. Up

until now the machine tools were more than a match for the cutting tools being used. Sintered, carbide cutting tools were introduced and promoted but could not be used to any great degree of efficiency because the machine tools did not have the power, rigidity or speed which are the three main essentials for good carbide conditions.

During the late 30's and early 40's, the cutting tools were designed and developed to a degree of efficiency and capacity far beyond the standard line of machine tools. This now presented another new problem. It seems as though design and product development follows a cycle pattern. First one component is improved to match a lagging companion phase, but usually is developed to a degree where the previously superior section becomes the lagging section and the cycle thus begins all over. This not only keeps the designers busy, but it puts a continual problem before the sales and maintenance sections of machine tool vendors.

As a result, societies for design engineers have been organized to study major trend changes and to control to some degree these changes which might affect the entire mechanical industry. When cutting tool trends are altered to any serious degree, the machine tool designers and builders must be consulted so that speed and feed controls as well as power, slides, chip control, coolant supply and other factors may all tie in together to make well balanced operating units.

Since World War II, tool engineers and machine builders have made much more progress in modern design than was possible during the war. Several reasons may be advanced for this. During the war it was not considered wise to spend time and effort in development other than in work directly connected with the war effort.

Since the war, most industries have gone all out in expansion programs to produce more and better products. This could have been done only through the use of better manufacturing equipment. The competitive spirit which gripped the country spurred each machine tool builder on to achievements never before attained. The transfer machine, which had not come in to a more universal use, now became a "must" where, before and during the war, they were not too widely used.

Building transfer machines for post-war products must embody improvement in tooling and tool set-up that was not a definite requirement when single machines were used. Tools must be pre-set and available for quick change; thus the tool-board was developed. Gages for pre-setting these tools must be of simple design and embody accuracy of setup. They, too, must be so designed that their construction cost would not be prohibitive.

These transfer machines must be so designed that should engineering changes occur, major obsole-

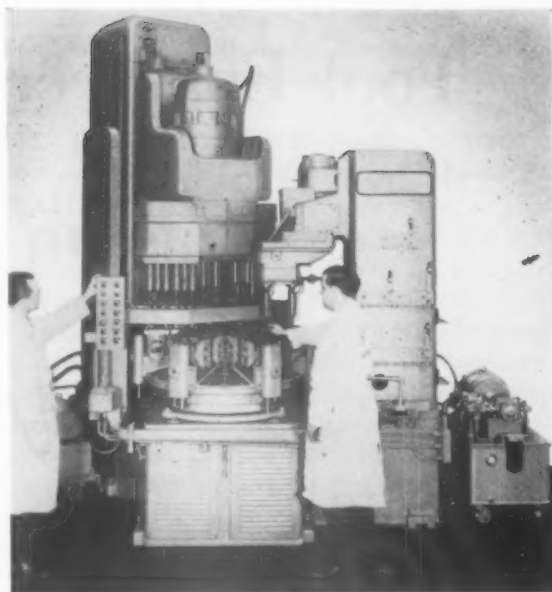


Fig. 3. Here is a six-station vertical drilling and tapping machine for processing differential bearing caps. The work cycle is 21 seconds.

tion of machine units would not be necessary. Another item of great importance that must be developed and designed into the machine is the signal system that reminds the operator of the proper time to change tools. Tool and development engineers established economical cutting periods for practically all tool conditions, and this study has been used in signal light systems which warn of expiration of safe tool cutting cycles.

The signal is usually a red light placed above the unit where the cutting tool is in operation. When the established number of parts have been run, the light signals to the operator and the machine is stopped and the tool is changed. Tools in these transfer machines usually give better performance than in manually-operated machines. The main reason for this is the elimination of accidentally hitting the corners of the cutting tools during the loading and unloading cycles, when parts are handled manually. Many times a slight contact of the tool by the part will nick, chip or burr the tool cutting corner or edge and greatly reduce tool life and efficiency.

Another phase of designing that was of great benefit to industry as a whole was the standardization of machine tool components such as hydraulics, electrical hook-ups, controls, panels, etc. Shortly after the close of World War II, representatives of the larger automotive companies met and discussed plans for a standardization of design for the post war programs. As a result of the meeting of these few men, the advisability of a more far-reaching movement was quite apparent. Various committees were organized for separate study, such as hydraulics, electrical, die room standards, milling

(Continued on page 122)

Tool Engineering

as an Investment

By Robert T. Kimmel

IN FAR TOO MANY industrial corporations and organizations, the function of tool engineering is considered as a present activity and is charged off by the accounting system as an operating expense. In many of the larger corporations, this viewpoint has been modified so that tool engineering is now considered as an investment in the future and any funds appropriated for this work is considered as spent on the same basis as that for research. And indeed it is research except that it is frequently known by a variety of other designations.

In some instances it is called production engineering. Another organization designates it as process development. In still another it is called manufacturing engineering, but is located in the research section of that particular company.

The major point to be made is not that the name should be standardized, however much that one step will simplify recognition. The main objective is to have management recognize that tool engineering on present and future processes, products and equipment is just as much an investment in the future as the work done in research laboratories on future projects.

One of the evils resulting from the short-sighted viewpoint is that as soon as an immediate problem is solved, the group assigned to the work is dissolved and no further studies are made until trouble arises again, and it is necessary to recreate the disbanded section, although in some cases, only one or two men may be involved.

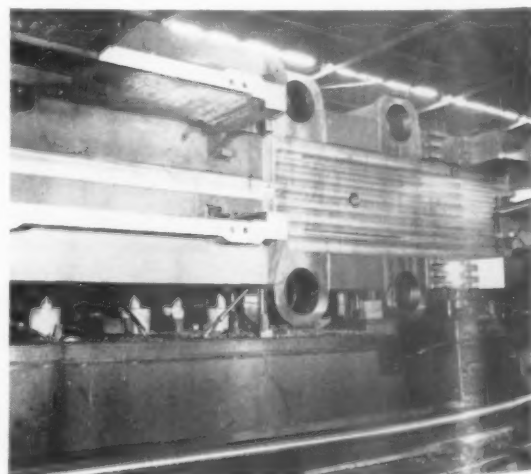
Manufacturing organizations are not static in their operations. The new problems arising from day to day in even the smallest shops require endless time and effort to keep the product moving to the shipping department. When the solutions to these problems are arrived at by the operating personnel, it is very likely that not too much effort

has been made to find the best solution, but rather the quickest one. The end result is that money is lost, not saved.

At the present time, the emphasis is on speed, and with so much of the nation's materials devoted to military purposes, there is no great amount of competition among the various companies in any one industry. But that picture is due to change radically in the not too distant future. At that time, there will be available greater amounts of raw materials, machine tools and skilled labor than ever before for the civilian economy. It is at that time, that the companies which have made their investment in the future some years previously are going to appear as the leaders in their fields.

During the depression two large competing corporations had a sales ratio of about 4:1. The larger

Fig. 1. A background of knowledge and reports on new techniques are necessary when a job such as the milling of the base for an 8,000-ton hydraulic press is undertaken.



company decided that the last place to apply budget cuts was the research laboratories. The other cut straight down the line with no distinction for any particular division or section. The net result was that as the state of the national economy improved, the larger company increased its sales tremendously in comparison with the other so that the ratio stood at about 6:1. To conclude the example, the second corporation again appropriated sizeable research funds, but it was nearly ten years before it had regained its former position in the industry.

While the above is concerned with pure research, the analogy to tool engineering is too explicit to need further amplification. When tool engineering, regardless of the nomenclature, is assessed as an operating expense, it is certain to suffer when the annual budget is prepared if other companies are not doing exactly the same thing. Competition is such that the improved product or the cheaper of two comparable products is bound to capture the market.

Some years ago, a company was reorganizing its operations, and after the whole complex system was reduced to three divisions, one member of the committee concerned with the new setup inquired about manufacturing. The resulting blank stares from the other committee members would have been amusing, had the omission not been so serious. It had just never occurred to any of them that they were overlooking what was by far the single biggest item in their dollar expense. It has been estimated the production activities account for as much as 90 percent of each dollar of volume. Yet here it had been neglected altogether until one man happened to reflect on the overall picture.

As a result of further deliberations in this particular reorganization, another box was drawn on the organization chart and the functions designated for it were to study processes and equipment.

Out of an operation of this kind have come sev-

eral distinct improvements and advantages. To put the first one generally, it buys time for the work to be done by the tool engineer on present processes and equipment. When he is not harried by the current operating problems, he has time to think, to read and to reflect. These are prime requisites for this kind of work and must be provided.

A recent example of this requirement for time, not only for the thinking, but also for the protracted experiments required, is the announcement by Chrysler Corp. Engineering Division and General Motors Research Laboratories of a "gold standard" of surface finishes. These will soon be made available to all industries for improving quality control of machines parts. This is the climax of a seven-year cooperative engineering project conducted by the two companies. The significance of these master specimens in the field of surface finish measurement is comparable to the importance of the Johansson gage blocks for dimensional measurement standards.

The development of these uniform precision standards for surface roughness measurement could never have taken place if the money had not been provided on a long term basis and the project set up as an investment for the future.

When a tool engineering group has been created on an investment rather than an operating expense basis, several further advantages will accrue. An important item here is the creation of a center where information may be exchanged. No doubt countless dollars could be saved if there were a method to prevent duplication of the same work. This is particularly important within any one particular manufacturing concern.

The solution to a problem should begin with what is known at present rather than with an extensive investigation from the beginning. When an engineer can state his problem, and then find what is already known from past experience and research,

Figs. 2 and 3 illustrate the contrast in the size and nature of the projects tool engineers are connected with. At the left is the huge rotor spider for a hydro generator, while at the right is shown a simple grinding operation.



he has eliminated a considerable amount of the time and effort which would be required if he had to work alone. Sometimes the solution is as simple as reading a report and finding that someone else in the organization has already come up with the answer.

But in any case, if the fund of previous experience and knowledge is available, the engineer is then prepared to go forward. An important point here is that he is much less likely to engineer himself into new difficulties.

Another factor to be considered is that when such a group as discussed here has been established, there will also of necessity be included the facilities for study and experiment. This will eliminate the need for constructing new machines or buying equipment each time a problem arises, as so frequently happens when the tool engineer is not segregated from the manufacturing department.

It should be stated here that the idea expressed in this article does not call for the removal of all tool engineering from the operation departments. Far from it. That would obviously be impossible and would be most undesirable.

One danger that arises when tool engineering is segregated as an investment project is that there will be too great a separation between the development section and the operating divisions. This difficulty is inherent and careful and intelligent planning is called for to avoid it. Some method of continuing communication between the two must be devised so that there is a two-way flow of information.

A company with widely scattered plants which has also adopted the idea of tool engineering as an investment has included in the section some "salesmen". These men are intimately informed of what

Fig. 4. Shown here are some of the men who work in a tool room where they keep in service some 230,000 active tools, and in addition produce about 85,000 production tools a month.



Fig. 5. When the parts to be machined are as large as shown here, ingenuity must be called on for materials handling and for adapting machines for the purpose.

is being done in the "home office". Each has a contact in the plants he calls on and with whom he can discuss new developments that have taken place in other plants and whether or not they can be applied to any of the processes or equipment in the one in question. At the same time, he can discuss and report to his own section any difficulties which may need attention.

The onus of communicating new ideas and developments to the operating division should be a function of the development section. It is also more economical, both from dollar and time considerations, usually because of the number of personnel involved.

After this idea of tool engineering as an investment has been adopted, it is easy to measure the benefits which will accrue. There should be no difficulty in measuring directly by factual knowledge of conditions the quality and the cost of a product both before and after a certain improvement has been made. This measurement can be made in dollars and cents and can be compared year by year with the investment made. From past experience, several companies have made this comparison, and the question arises, "Why wasn't this system put into operation long ago?"

There is an additional savings, too, which is frequently overlooked. It might be called a sort of compound interest. The savings made the first year do not end at the end of that year but are continuous in succeeding years.

Just as this accrued interest may be overlooked, so are some of the intangibles. The contribution to



Fig. 6. Steam turbines are a specialized field and when of the size indicated by the spindle above, it is imperative that there be no mistakes or incorrect tooling.

safety, working conditions and the fund of available technology are tremendous. At the present time, working conditions are an important factor because of the employment situation.

The shortage of trained engineers and research workers is closely approaching the state of a national emergency. One noted authority in the field said that industry at the present time might absorb as many as 100,000 new graduate engineers each year. Instead, there will be available for industry and government service only 20,000. And, of course, the armed forces will claim a certain number.

It should, therefore, be obvious that trained personnel should be retained wherever possible. This cannot be done with the continual expansion and contraction of project groups to study special problems, which is typical when tool engineering is treated as an operating expense.

In addition, there is the investment in the training of these men to be considered. A new recruit in industry, or even an experienced engineer joining a new company, has a considerable period of adjustment to spend before the company which hires him begins to realize a return on the salary paid.

As a further argument for investment, there is the continually growing emphasis in government on research. The figures included in the budget recently sent to Congress are for \$1.4 billion for research and development by the Defense Department in fiscal 1953. This is \$400 million more than allocated during the current year. Nor do these figures include any expenditures other than by the Defense Department. The accent on competition

between industry and government for the people to do this work is apparent in these sums of money.

The need for training people to do the kind of work required in a development or research section is said thus by D. H. Killeffer in his book, *The Genius of Industrial Research*: "Basically research is a habit of thought and one that can be developed in the normally intelligent person quite as readily as a physical habit. Failure to cultivate research habits is responsible for many disappointments among hopeful young research workers.

"The scarcity of brilliant investigators grows out of ignoring this fact, and particularly from its corollary, that methods of research and development as practiced in our industries are not taught in our colleges and universities. The average graduate or post graduate going into research has to learn, if he ever does, by hard experience the simple principles of his art."

Here again is a support for the premise that valuable trained men are available only when there is a continuing nature to their work.

The wisdom of considering tool engineering as an investment has been established, but unfortunately, that knowledge has not yet been widely absorbed by industry, particularly in organizations other than the large corporations. When it is, and that time should not be too far in the future, with the current emphasis on research and development, the stumbling block is going to be the lack of investigators rather than money, unless management considers investing in the future during the present.

Fig. 7. An important part of the tool engineering field is inspection and gaging. Shown here are drill-collar master gages which have been tested and certified by the U.S. Bureau of Standards.



A Thesis on Production Planning in the Automation Age

By Robert L. Fleming

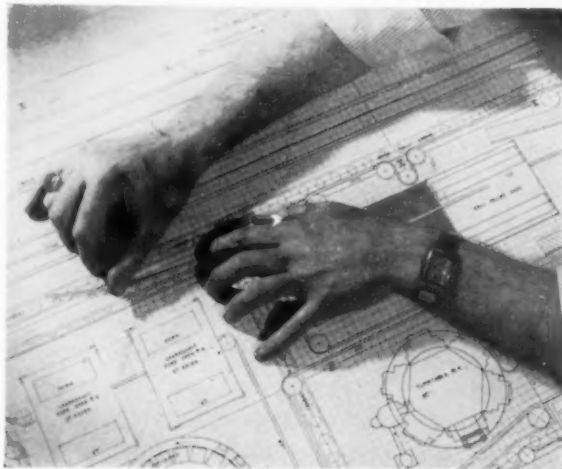
DEVELOPMENT ENGINEER
THE WEATHERHEAD COMPANY

SINCE THE ADVENT of the machine age, production planning has been the key to success of every manufacturing undertaking, and also much of the general business undertaking such as commercial, industrial and even wholesale and retail marketing. The essence of production planning is the ways and means of obtaining the highest ratio of work accomplished per given unit of time and/or per given unit of cost for the desired production volume.

In the early years, this was almost a human element alone, each worker varying in his degree of productivity as to his talents, alertness, agility and desire for accomplishment. Today, although the human element is still present, it is to an ever

decreasing degree, as a result of automation or the automatic cycling and control of manufacturing procedure from loading and other handling of the raw material, through the multitude of manufacturing operations to the unloading, handling and packaging of finished products. This automation is the result or outgrowth of progressive tool engineering. Through all of this, certain other factors enter into the production planning picture, such as quality control, production control, salvage of rejections, engineering changes, industrial relations, and the like. Of course, anything that is made must be sold or saleable (such as service, etc.) and thus must have sales appeal in order that the undertaking will be economically sound. Sales appeal is the principal job of product engineering.

Fig. 1. Effective plant layout is one of the primary steps in planning for production. Faults here will be expensive, whether they are corrected, or are permitted to stand.



Sales Appeal and Product Engineering

Sales appeal does not necessarily refer to looks, although in many things, it is essentially that. What sales appeal does mean is that it completely fulfills the needs (at least the immediate ones) of the customer, who is the ultimate or end user of the product. If he is satisfied by the service he obtains from the product, he is the best means of good advertising. Similarly, if he is dissatisfied, he automatically becomes the foremost business killer, and too high a percentage of them will ultimately ruin the business.

Most customer complaints will be legitimate, and the fault will be with the product in some manner, shape or form, or otherwise related to it. Such faults may be due to human error, and unrepairable if abstract, such as missing a scheduled delivery date to the customer's disadvantage; or they may



Selection of the correct equipment, such as the grinding tool shown at the left in Fig. 2, is essential if the cost and the appearance of the product are to



be maintained. At the right in Fig. 3 is a pile of scrap, salvagable material and rejects. Excessive waste must be eliminated.

be concrete, such as over or under charge, or short quantity, which errors can be repaired to some extent. Those faults, if not very frequent, are tolerable, but missing customer's specifications, or ignoring them completely by improper inspection procedure and the like, is inexcusable and should demand immediate attention and correction.

Quality Control

Practically every product has certain limitations on its manufactured shape, the material involved, tolerances on dimensions and numerous other specifications. These specifications determine the quality, and thus also the price of the product, in comparison with those of similar products. Quality control has always been a thorn in the side of manufacturers, because in most instances, some worker is to blame for the error in specification, and it is practically impossible under the present quality control setups to pin point the cause of the error. The cost of a complete 100-percent inspection of the product of each stage of manufacture would in most instances exceed by far the total cost of the product. Thus, a procedure must be arrived at somewhere between present inspection methods, and the 100-percent complete inspection procedure. A system using the laws of probability, plus a complete 100-percent inspection by skilled personnel of every 10th, 20th or 100th part (based on 1 part each hour of each shift), can be utilized. This one part per hour would be given a most thorough inspection at each manufacturing operation, within the hour after being picked up, tagged and delivered to a central quality control station by a stock chaser assigned to so many machines in a given area. The

person in charge of this quality control station would be delegated the authority to pass or reject a part and shut down normal operation of the machine and operator involved, until a good part was made and passed. This would eliminate, to a great degree, a huge run of bad parts made out of specification by the operator, whether knowingly or not. Quality control is always proportional in its needs, to the rate of over-quota production. Thus, the stiffening of quality control always reduces the rate of over-quota production, sometimes even to the extent of a minus value, indicating need for lowering the production quota, unless additional retooling would maintain that quota.

Production Control

Production control is, of necessity, geared to the capacity and/or production volume of the equipment available. Of course, the equipment chosen should be geared to the sales market volume, which the sales department determines on an annual basis (taking into consideration, sufficient warehouse inventory for possible seasonal sales fluctuations). The equipment chosen should maintain the lowest manufacturing cost per unit or part, which cost should also include a percentage factor to amortize the original cost of the equipment through its estimated life before repairs or obsolescence, plus its annual maintenance and other depreciation costs. In this automation age the trend is to fully automatic equipment where volume demand is sufficiently great. Increased labor costs are also influencing this trend, but the main factor is the faster handling and control of operations by automatically controlled mechanical and other cycling means.

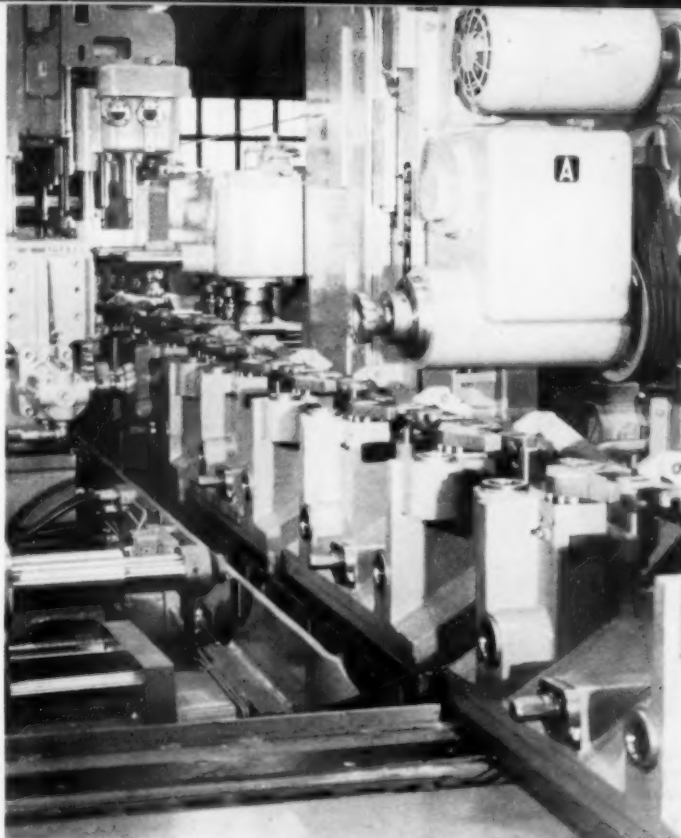


Fig. 4. In this age of automation, automatic machines are coming to play a greater and greater part in the factories, particularly in the mass production industries.

As previously said, production control is of necessity geared to quality control. It does not make much sense to maintain a very high rate of over-quota production which produces a very high rate of out-of-specification parts, especially when it usually produces far fewer correct parts than at "quota rate of production". In addition to that, customer's dissatisfaction does 10 times the harm financially, than scrapping the out-of-specification parts.

Tool Engineering

Before any manufactured product is made, one of the first things to be decided is the most suitable machines and tooling to handle the desired volume of production most efficiently and/or most economically. This formerly was considered a very small and rather insignificant detail handled by product engineering or what was just commonly known as the engineering department. However, since the advent of the machine age, through the evolution of mass production methods and up to the present automation age, this once small, insignificant detail has grown to a giant, now commonly known as tool engineering. It is a field of engineering, devoted to devising ways and means of making and/or doing things faster, better and at the lowest unit cost for the desired volume of production. Thus, the tool engineer has one of the greatest responsibilities in the whole production planning picture. The tool engineer is indispensable in this age of automation. His ingenuity and firmness of purposes, plus his up-

to-the-minute knowledge of the latest developments in tooling and machines, is his main stock in trade, which he constantly maintains and enlarges year after year. It is doubtful that tool engineering could ever be covered completely in the volumes of a single set of books, because before the ink was dry in the first volume off the presses, a major development or improvement would have, in all probability, been evolved. This is to point out the swiftness with which great strides are being made by this relatively young field of engineering.

Thus, through tool engineering, the product is prepared for the desired volume and/or rate of production from raw material through to the finished packaged product.

However, the best tooling in the world will not completely eliminate out-of-specification parts, since there is always some human error or mechanical failure eventually present. Thus, there is a need for another factor in production planning called salvage of rejections.

Salvage of Rejections

Many industries have established standards for certain service conditions in which their products are placed. The most accurate of their parts or products are suitable to the most exacting service conditions, but are really more accurate than necessary for other service conditions. For instance, pressure regulators for LP-gas equipment would demand the most accurate parts to meet the high exacting service conditions involved, because of hazard and costs of the LP-gas. However, the same pressure regulator with less accurate parts might well be suitable for control of air pressure in braking systems in the automotive fields; to air-operated equipment installation, and similar less hazardous and less exacting service conditions. With sufficient thought and planning, these ordinary rejections or scrap could be salvaged for less exacting service conditions in many fields. This would involve considerable engineering change and color coding, or other simplified marking systems to identify the out-of-specification parts and the service conditions for which they might be suitable.

Engineering Changes

This work has to be performed diligently, and frequently with more involved thought than the original specifications. Ramifications due to unaccounted for conditions are the usual pitfalls for which the engineer must be ever on the lookout. And the man in the shop usually gets the impression that the engineer behind the development of the part or product did not know what he was doing in the first place. Thus, industrial relations between the engineering department and the manufacturing departments, which must follow the prints to make the parts or

products are bad, and it also has its effects on the rate of scrap. The reason usually is that the workers underestimate the need for the accuracy which the engineer requests on the blue print.

Industrial Relations

A winning team is always one which works very closely together, synchronizing their actions to accomplish the most with the least waste in time or effort. The same system should work with an industrial organization if the proper fundamentals of fair play, equal recognition for accomplishments, and suitable remunerative means, such as bonuses for higher point efficiency, are adopted by all. True enough, some individuals are perpetual slackers, and will take advantage of an over-all bonus rating, but that need not be the case.

Progressive Efficiency Point System

In this point system, every employee or worker starts out at a point rating of 100. Every job throughout the company (that can be rated) will have a production quota of a specific amount, and this production quota would be given a point rating of 100. This rate of production would carry a specific wage rate. If at the end of a three-month period, an employee meets this production rate on the average of good parts, he would get a rating of 100 for the following three months. If he met the production rate on the average, but had an average scrap rate of 2 percent, he would get a point rating of 98 for the following three months, and an equal lower rate of pay.

If he went over the production rate by 2 percent, but still had a scrap rate of 2 percent, his point rating would be 100 at that rate of pay.

If he went over the production rate by 4 percent but still had a scrap rate of 2 percent, his point rating would be 102 for the following three months at an equally increased rate of pay.

There would be no limit to the amount that an employee could go over the normal quota of the production rate, provided the scrap rate did not go over 10 percent. Thus an employee could go over the production rate quota by 15 percent, with a scrap rate of 10 percent, and get a point rating of 105. Or an employee could go over the production rate quota by 7 percent, and with a scrap rate of 2 percent, he would also get a point rating of 105.

However, an employee that went over the production rate quota by 20 percent with a scrap rate of 12 percent, the 2 percent over allowable scrap would be subtracted from the 20 percent over quota leaving 18 percent, and then the 12 percent scrap rate subtracted from 18 percent, and he would get a point rating of 106. This would be to discourage high scrap rates, incurred by trying for excessively high production rates over the quota.



Fig. 5. The tool engineer, working with the machine tool builder, has been designing machines which will do more operations faster with greatly reduced need for skilled labor.

An employee, who got a point rating under 100 for six months in a row without a good reason, such as physical handicap, nervous disorder or other legitimate cause, would be considered an undesirable employee, and laid off after the first warning and three-month trial period.

For those jobs which cannot be specifically rated, the foreman or head of the department would be given a separate scoring system, based on each particular type of job. But essentially the same procedure would be followed.

Some opposition might be met from labor unions to such a plan as this, since the employees will be getting more accurate work done as a result of having to be on their toes, and doing more clear thinking about their particular jobs.

No one can say that this would not be a fair plan to everyone because, essentially, everyone would be governed by it, and profit by it according to their own fair share. In short, they will profit if they work for it, and vice versa.

In this present automation age, a company either gains or loses in business volume, but rarely stays at a definite business volume through a period of five or ten years. The determining factor as to whether a certain company will gain or lose in business volume is how well top management worked out together their own production planning problems by considering all of the important factors as previously outlined. The theme of this production planning should be teamwork.

*A Tool Engineer study of tooling practice
and methods in tooling and production
during the forthcoming biennium*

1. Machine Tools

By Ben D. Smith

GENERAL SUPERVISOR
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INTERNATIONAL HARVESTER COMPANY

THE MAJOR PROBLEM faced by management and the engineer today in maintaining a sound business future is the constantly increasing cost of labor. One solution lies in our ability to obtain greater utilization of available man power by providing the worker with improved tools, capable of increasing even more his productivity potential. Of major importance then is what is the current thinking on the design requirements of machine tools and what may we expect of the future.

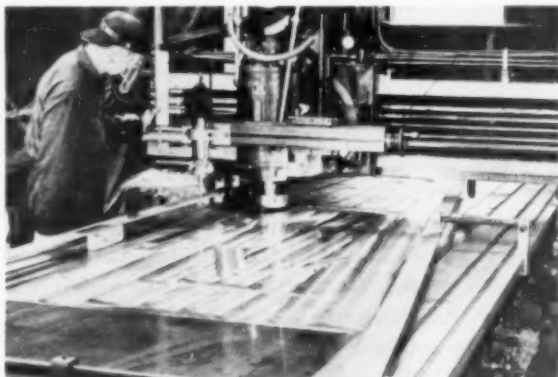
Designing machine tools for the user has posed quite a challenge to the machine tool manufacturers, primarily due to the people who buy or specify the machines. A few years ago, many buyers insisted more on streamlining and styling, disregarding many disadvantages which were necessarily built into the equipment by doing this. However, in the past few years, and possibly in the future, more emphasis has been placed on maintenance and re-

pair, machine performance, operational flexibility, cutting tool life, work and process handling, safety of the operator, and many other items very important in the function of machine tools. The styling of machine tools is necessarily important but is minor compared to the above requirements.

Maintenance and Repair

In the original design of machine tools, more emphasis is being placed upon maintenance and repair, especially in the high production equipment. This has been evidenced by the fact that the Joint Industry Conference was established to set up standards by which machine tools and industrial equipment would be designed and built, with the main thought in mind of reducing the maintenance cost and the corresponding production loss, due to down time for maintenance. These conferences were attended by machine tool manufacturers as well as the users of the equipment. One of these standards which has been established is the Hydraulic Standards for Industrial Equipment. This standard specifies that the design be such that all units, as pumps, piping, valves, fittings, etc., be so located and marked that the maintenance man can readily trace and repair the equipment without the need of tearing the machine tool completely down. This latter situation has frequently been the case with many machine tools built in the past, especially in those instances where a streamlined design was stressed. In other words, the units, piping, etc., are placed in most cases, on or near the outside of the equipment. This necessarily takes up more room and, in some cases, does not allow for good styling. Such maintenance considerations are most import-

Fig. 1. Skin milling an aircraft part on a planer equipped with an Onsrud high speed milling head and tracer-controlled by a Turchan follower attachment.



ant at a time when management wants and expects maximum production from equipment. Proper design of this equipment will do much towards insuring proper preventive maintenance, minimizing breakdowns with a consequent loss of production, and result in better maintenance control.

Other IIC standards have been, or are in the process of being, developed with the same thought in mind. Some of these are in the field of pneumatics, electrical, mechanical presses, etc., which will be in use more as new machine tools are developed.

Machine Problems

It is not the intention to overlook many other features which must be designed and built into machine tools. The primary requisite is performance for holding tolerances and quality of work performed. However, the aforementioned can be included without interfering with the performance of the machine tool. In recent years, engineers have been more conscious of machine problems because of the effect of statistical quality control programs. The more extensive application of these programs in manufacturing plants has focused attention on many examples of over-rated problems. Engineers are using statistical methods to develop historical data on machine operating characteristics. These procedures enable the engineer to spot inconsistent problems which lead to, or cause a defective product. It is essential then that the problems of the machine tool design and quality control of the work-piece be considered at all times in the designing and building of equipment. Several things have been done along this line. When the demand requires it, special features can be built into the

Fig. 2. New materials are creating new problems for the machine designer. Shown here is flash-welding of aluminum, a metal which is being used more extensively.

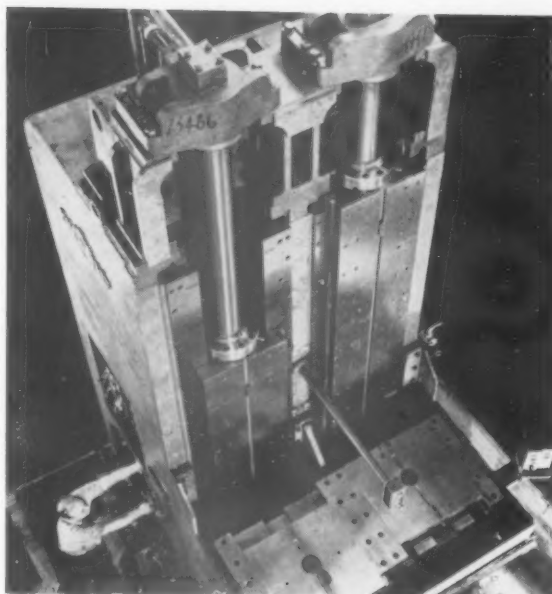


Fig. 3. Typical of some of the new giant machines for the defense effort is this Colonial vertical surface broach which has a dual ram with a 90-in. stroke.

equipment. An example of this is the installation of heating units near or around functional parts, to compensate for the fluctuating temperatures which exist in most manufacturing plants, those in particular which are not suitable for air conditioning or temperature control. These heating elements can be built into spindle bearings, journals and fixtures, or wherever required to control close finish tolerances in the piece part.

Machine Flexibility

The variable speed drive will be more widely used. This gives the machine tool additional flexibility by allowing an infinite number of steps between the minimum and maximum speed of the machine. Thus, for a specific operation, the exact revolutions per minute required may be used, instead of the nearest one available on the machine tool. The variable speed drive usually consists of an ac-dc motor generator set, with a voltage control d-c motor on the equipment. The mechanical system for stepless operation of speed usually consists of pulley drives.

More work will be done on each machine. Production will be increased by using more attachments on standard machines to eliminate secondary operations. An example of this might be induction hardening of the part, simultaneously with the machining operations.

Cutting Tool Life

The problem of tool life will also have to be considered in any future machine tools. One of the biggest problems is to get the coolant to the point of the tool, since this is where most of the wear takes place. This might be done by using a high-

pressure system for applying the coolant or by the use of a super coolant. Further research and investigation should be done on this subject to develop the most effective method of maintaining low tool temperatures.

Work and Process Handling

Material handling of work in process is a very important phase in design of machine tools and equipment. In the past, practically the only time this was considered was in very high production lines. Now it is becoming more important in lower production, due to the high labor cost. This is one reason; however, generally speaking, there are other factors that point toward automatic mechanical handling, such as scrap and rework of parts caused by improper and abusive manual handling.

Basic Problem

Past experience has proven that much can be done for the future design of machine tools in the way of increased rate of metal removal by means of increased feed speeds and depths of cut. This means that the equipment must be built with more rigidity and use of such devices as vibration dampeners with more accurate tolerances for balance and hydraulic and pneumatic feed mechanisms. The power of the electric motors must also be increased if the rate of metal removal is to be increased. The use of dual rated motors will help give this additional power so that each machine tool may be run under as close to the optimum cutting condition as possible.

New Methods

New methods of machining will be used on the present-day hard-to-machine materials. This will require special machine tools or unusual combinations of standard equipment. A good example of this

Fig. 4. To reduce cleaning time, brushes have been mounted on a 12-head spindle, rotate at 800 rpm, and complete the operation in 30 seconds.

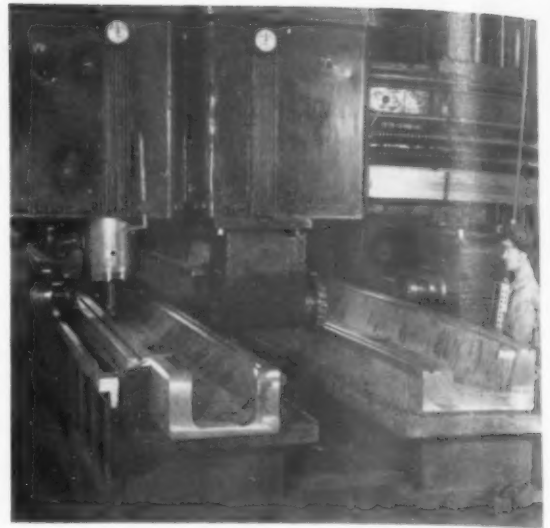


Fig. 5. Work and material handling is an important consideration in the design of machine tools. Shown here are four heads at work simultaneously on an Ingersoll adjustable rail milling machine.

might be hot machining. Here is a standard lathe, mill, planer, or other metal removing machine used in combination with a means of heating the workpieces. This heating can be done by gas, electric arc, or induction. The heating of the work would allow the cutting tool to remove metal at a very high rate. Special tool materials would have to be developed along with the equipment because of the adverse effect of heat on tool wear. Also, in this category are such methods of machining as electric spark or arc disintegration, and vaporization of metals. The machining of cast alloys and carbides is particularly adaptable to this type of metal removal.

Continued Research

Most of the items mentioned are being, or have been in use in certain types of machine tools and equipment. However, it is felt that more stress will be placed on these subjects in the future designs and it is to be hoped that the present regulations which have been placed on the machine tool manufacturer and the users because of the present defense program will not retard the advancement of the machine tool industry. We are quite confident that this will not be so, however, indications are that certain research work now being done throughout the industry may have to be curtailed. The future holds much promise and will bring with it new and revolutionary advancements beyond present perspective. One such advancement might be the use of electronics for the control and operation of machine tools through the use of wire or tape recordings, or working directly from punch cards, templates and blueprints. The strides made in this area of investigation up to the present time are encouraging and might well change the whole course of designing future machine tools.

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2. Assembly Tooling

By John Starr

IN THE MANUFACTURE of many complicated products, assembly tooling remains the number one industrial enigma.

Airplanes, automobiles, seagoing vessels, railroad cars, etc., are designed with unprecedented speed and precision. Tools are developed with which the parts of these structures may be fabricated in any desired quantity with reasonable economy. But, when the time comes to assemble the parts, efficiency usually becomes a wistful dream of the past.

Shop workers must devote long and tedious hours to the task of trimming and selective fitting before the parts can be mated. Then assemblies must be made with tooling that is frequently inaccessible and rarely coordinated.

This is not the tool designer's fault, since he has to be quite ingenious to improvise any sort of assembly tooling in most circumstances; nor is it the fault of the tool fabricator, who is too frequently expected to use one-dimensional tools in constructing three-dimensional structures. So what can be done?

Preplanned Assembly Tooling

A small, but growing number of manufacturers, including North American Aviation, Chance-Vought, Consolidated Vultee, Lockheed, Nashville Corporation, and St. Louis Car Company now have an answer to that question. It is not a perfect answer in terms of every conceivable detail as yet; but it appears to have an extremely firm foundation, as indicated by the following summary of principles:

(a) Assembly tooling should be preplanned, the same as fabrication tooling.

(b) If any amount of production is required, the

breakdown of parts should be such that parts can be rapidly subassembled with small and relatively simple assembly tools, thus eliminating the need for huge and inaccessible assembly bucks or fixtures.

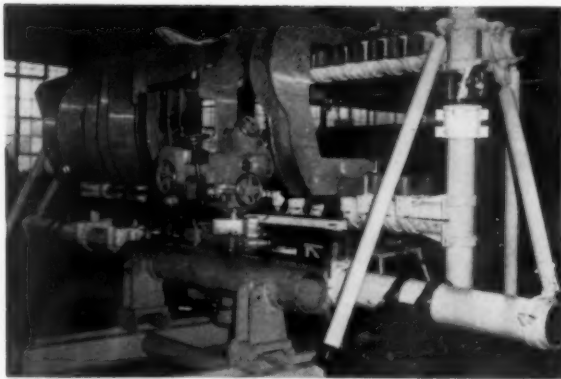
(c) Designs for assembly tooling should be standardized as much as possible to simplify and accelerate the work of the tool engineer, the tool fabricator and the production employee.

(d) The tool fabricator should be provided with the sort of instruments he requires to make truly coordinate assembly jigs and fixtures. Fig. 1.

The general tendency to improvise assembly tooling for a breakdown of parts that cannot be efficiently assembled can be attributed directly to the need for prototypes. The latter obviously cannot be manufactured with the best types of production tooling, since engineering changes alone could make the cost of such tooling prohibitive, regardless of whether it can be safely assumed that prototype will eventually be mass-produced.

Fig. 1 shows sub-assemblies of the F-86D which can be satisfactorily aligned with standard handling equipment for final assembly.





A fully reclaimable fixture made from standard components is shown above in Fig. 2. The cost of this kind of tooling is relatively high, and is likely to require a great deal of maintenance to preserve its rigidity.

However, assembly tooling specialists for the aforementioned firms are now inclined to agree that it is no more difficult to fabricate a prototype with a good production parts breakdown than with the sort of parts breakdown that is usually considered most convenient because the production breakdown makes it possible to utilize certain universal assembly tools, which would not otherwise be practical.

Master Paneling Fixture

A good example of the universal assembly tool that can be used in constructing a prototype is the master paneling fixture, recently developed by Leland A. Bryant. This fixture is an adjustable frame or structure on which a variety of locational elements or formers can be mounted as necessary for the production of different assemblies.

Two vertical sections of steel casing and two horizontal straightedges are basic components of the master paneling fixture. One straightedge is rigidly assembled at each end to the lower portion of a vertical member, while the second straightedge is mounted above and parallel to its mate so that it can be manually elevated or lowered by means of a cable-pulley assembly and a counterweight within each of the vertical casing units. T-slots on the vertical casing units make it possible to lock the upper straightedge with T-bolts at any altitude that may be essential to the use of a given sequence of formers, and the following detail on each straightedge permit the temporary mounting of formers with maximum speed and ease:

(1) A sequence of tooling holes, jig-drilled on one edge at precise 10-in. intervals and extending from one lengthwise end to the other. These holes make it possible to use strip templates or micro-bars to ascertain station locations on the straightedges with dimensional tolerances of 0.005 in. or less.

(2) A T-slot (on the upper surface of the lower

straightedge and on the lower surface of the upper straightedge), in which an adapter fitting can be assembled with a T-bolt at each station location. Purpose of the adapter fitting is to provide a tooling hole for the assembly of one end of a former to the tooling structure at each station location by means of a bolt.

Adapter fittings are first mounted at all stations for a given assembly on the straightedges of a master paneling fixture; then the usual practice is to align and assemble formers in the third dimension with optical instruments. This costs very little because the formers are templates which can be rapidly fabricated and mounted without a new fixture structure for each assembly, and because prototype parts could not be mated with comparable speed and accuracy if no assembly tooling were available. In point of fact, one airplane manufacturer has reportedly saved an estimated \$9,000 of what might have been a \$10,000 expenditure by using a master paneling fixture for the assembly of one prototype wing tip.

Parts Breakdown

In order to create a parts breakdown which will facilitate the development and use of assembly tools, some sacrifices may be required in terms of fabrication efficiency because it is obviously not always possible to make two small parts for the cost of one large part. However, losses of fabrication efficiency are usually negligible if regarded in terms of the desirability of efficient assembly operations; and, in this connection it is extremely important to bear in mind the structural features which are most desirable in an assembly tool. Such features, according to a recent survey of assembly tooling specialists, include:

Simplicity. The design of the tool should be such that it can be inexpensively fabricated and then loaded, worked, or unloaded with maximum speed by workers with little skill or training.

Accessibility. An assembly jig or fixture should enable a worker to mate parts without stooping, bending or stretching because the most skilled employee becomes incompetent as the result of fatigue.

Durability. No tool can be regarded as efficient if it will not withstand a certain amount of abuse without being constantly proofed and repaired.

Productivity. Each tool must constantly yield a predetermined number of assemblies in a given amount of floor space if overall production schedules are to be maintained.

Portability. An assembly tool should be portable, regardless of whether it is intended for use in the tool-fabricating area, since all production facilities may have to be moved for the sake of efficiency if practical experience proves that a preliminary floor plan is not completely effective.

Adaptability. The structure of the tool should be such that it will be unnecessary to build a new assembly jig or fixture each time an engineering change is specified.

Salvageability. As many tooling components as possible should be designed so that they can be reclaimed for further use with minimum difficulty when an assembly jig or fixture has served its purpose.

Safety. In addition to preventing personnel accidents, an assembly tool should be foolproofed so as to eliminate the possibility of costly mistakes in mating similar parts.

Standardization

The concept of standardization is much easier to discuss than to practice in the design and construction of assembly tools, because slightly different assemblies may necessitate the use of vastly different jigs or fixtures. However, aside from the fact that devices such as the aforementioned master paneling fixture can be developed for production work as well as for the construction of prototypes, there are two very practical standardization techniques that can be applied to virtually any assembly tooling problem.

One of these was recently advocated by the Air Materiel Command in connection with the optical tooling program.

It consists briefly of using standardized lengths of oil-well casing, clamp-type castings, bolts, etc., so that each basic structure for an assembly tool can be built up much the same as a youngster constructs various articles with the components of an erector set. See Fig. 2. This is without doubt advantageous to the extent that it facilitates the reclamation of all components, except for the locating elements, of each assembly jig or fixture. However, experienced assembly tool designers maintain that this type of standardization is desirable only to a limited extent because tooling structures comprising nothing but standardized parts are often likely to be too cumbersome and inaccessible as compared, for example, with the welded steel structures which are now in common use. Assembly tools whose rigidity depends on the tightness of nuts and bolts are also likely to require too much maintenance. The initial cost of standardized tooling components is comparatively high, and there is a good chance that many of these parts will be damaged so they cannot be used more than once or twice.

The alternate method of standardizing assembly tools was evolved by Consolidated Vultee Aircraft Corporation in the closing days of World War II. It consists of using limited quantities of standardized parts and preparing basic tooling designs in conformity with standardized procedures.

This is illustrated by the following specification

for a picture frame fixture:

"Each picture frame fixture will be so constructed as to form a square or rectangular frame, the work area being in and around the enclosure thus constructed. It will in all cases be fabricated by welding standard steel pipe sections, and its end profile will always resemble an inverted T—the vertical leg being one side of the picture frame, and the horizontal leg being the supporting member. There will be a horizontal supporting member at each end of the fixture, and its length will comprise the full width of the fixture.

"The completed fixture will be supported by machine screws, tapped into blocks welded to the horizontal end pipes; and, while there will be five of these screws on each fixture, only three will be actually used for support—the remaining two serving as safety feet. Two of the supporting feet will be at the outer ends of one horizontal leg, while the third support will be in the center of the opposite leg (with a safety foot at each end of that leg). Each screw shall be provided with a lock nut to insure a permanent setting, and the length of any screw shall be held to a minimum—an inch adjustment being considered sufficient.

"Fixtures from 216 to 288 inches in length shall have a handling or shipping break at the center, and any fixture with a length of more than 288 inches should be divided into three approximately equal segments. If a fixture is to be broken for shipping, the three-point suspension should be supplemented by an additional point of rest at each break. The coupling for each break will comprise two round steel flanges, one welded to each segment, and each pair of flanges will be held together with screws and dowels. The flange diameter should be four inches greater than the diameter of the pipe used in making the fixture."

In addition to simplifying the work of the tool designer and the tool fabricator, specifications of the latter type enable a production worker to handle a variety of assembly operations by providing him with jigs or fixtures of a uniform nature which will not strain his imagination.

Devices that have been (and are still being) used to position the locating elements on assembly tools are quite numerous, ranging from the micrometer to the surveyor's transit and the carpenter's plumb, most of which have two major deficiencies: Their accuracy in any event is dependent on the alertness and skill of a toolmaker.

Their use in locating three-dimensional points in space requires trial-and-error experimentation, cost of which usually precludes the possibility of obtaining coordinate assembly tools for the production of interchangeable assemblies.

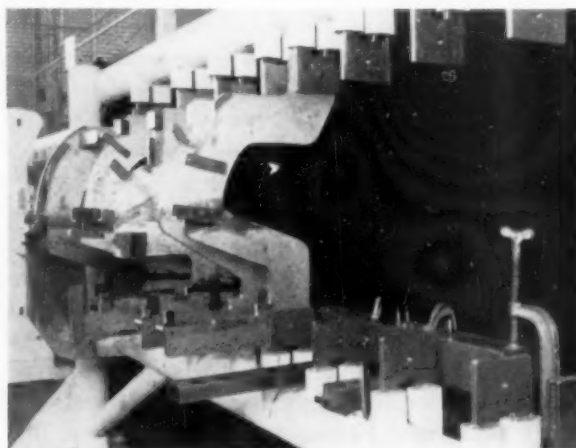
Collimator-telescopic instruments (of the type used in fabricating the aforementioned optical tooling) and master tooling dock facilities are at this

writing regarded as the only reasonably efficient three-dimensional positioners. Optical instruments of the type in question have been well-known to European manufacturers for at least fifteen years, although they are still regarded as new in the United States, and they are primarily advantageous to the extent that they involve a relatively low expenditure for equipment. The master tooling dock was initially developed in the United States during World War II; and, despite a relatively high cost, it is still gaining popularity because of its extreme accuracy and reliability. See Figs. 3 and 4.

Purpose of the optical positioning equipment is to establish an optical datum line by mounting a telescope and a collimator on gaging pieces at opposite ends or sides of a jig or fixture. The telescope is a more or less conventional lens system with graticule in a hardened steel tube, and it is externally focused so that displacement can be observed by means of the graticule. The collimator has a steel-tube housing with a light bulb in its after end and its purpose is to convert the output of the bulb into the aforementioned datum line (for observation with the telescope) by means of a condensing lens system and a collimator graticule.

When a collimator and telescope are mounted at a given altitude, the first dimension in space is established and the second dimension can be ascertained by adjusting the telescope and collimator until the optical datum line of the latter is aligned without displacement with the telescope graticule. Then the usual practice is to use a cursor or runner mechanism with a vernier gage (known as a sighting target) to find the third dimension with reference to the optical datum line. Tooling locations thus established may be accurate within a theoretical tolerance of plus or minus 0.001 in. if the best possible instruments are used by the most highly skilled toolmakers, and if there are no disturbing influences such as a strong draft of air in the room.

Fig. 3, left, shows an assembly tool with locator plates positioned in a master tooling dock. Note how the formers are bolt-assembled with the locator plates by means of matching tooling holes. At the

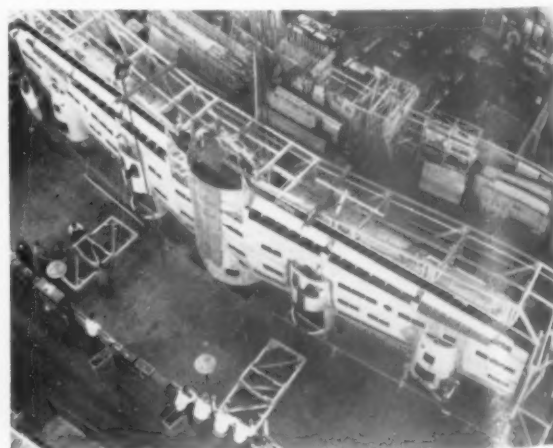


The master tooling dock, on the other hand, is a sturdy steel structure which has been utilized by semi-skilled workers in coastal areas, following such major disturbances as earthquakes, without an appreciable loss of accuracy. Its function is briefly to duplicate the grid-plane system used in lofting a complicated product, so that the straightedges used by draftsmen in finding two-dimensional locations will be figuratively projected into the third dimension.

Inherent stability is normally attained by mounting the dock's rectangular superstructure on a floating concrete base, and by using a sequence of heavy steel straightedges to designate grid lines within the superstructure. Four rigidly mounted longitudinal straightedges are used to find each station location or the first dimension in space, after which the second dimension (or water line location) is established by means of two vertical straightedges which are movable and the third dimension (or buttock line location) is ascertained by mounting a transverse straightedge on the verticals.

Each and every tooling dock straightedge has a series of precision-drilled holes at 10-in. intervals and a lengthwise T-slot. The holes are centered on grid locations and their functional purpose is to match the holes in one edge of a master gage or strip template, so that the latter can be mounted on the straightedge by means of dowel pins. A strip template is merely a strip of cold-rolled steel with holes drilled in two edges; and, when mounted, it extends beyond the straightedge so that the holes in its protruding edge will respectively designate one-dimensional tooling locations. This in turn makes it possible to mount a metal fitting at each one-dimensional tooling location by means of a T-bolt in the slot on the straightedge. The number of strip templates used in operating a tooling dock is proportional to the dimensions of the tools or products that must be manufactured, because the loca-

right in Fig. 4 is shown a huge assembly block which has been used extensively for manufacturing airplane wings as well as other complicated structures in other branches of industry.



tions designated by the templates are the same one-dimensional points which are established by the design details of the products.

In the actual operation of a tooling dock, the first dimension in space is found by using a strip template as noted above at a station location on each longitudinal straightedge. Then the vertical straightedges are attached to the longitudinal fittings, and the second dimension is established by using a strip template to mount a metal fitting on each vertical straightedge. Next, a transverse straightedge is assembled with the vertical fittings and the third dimension is fixed by using a strip template to locate a fitting on the transverse straightedge. Two or more transverse straightedges, and four or more vertical straightedges, may be used if necessary to establish more than one location in the third dimension for a single positioning operation.

Tolerances that have been consistently maintained without proofing a dock have averaged plus or minus 0.005 in. or less for a period of three months; and in no circumstance were these slight deviations cumulative. Even where tooling locations on strip templates were improperly drilled, there was no loss of tooling coordination because the use of strip templates made it necessary to duplicate each dimensional deviation on every tool required for a given station location.

Limited tooling dock facilities have to date made it necessary for firms like North American Avia-



Fig. 5. Tool engineers demonstrate a method whereby optical instruments are now used to check the alignment in a master tooling dock.

tion, Inc., to use dock installations for the sole purpose of constructing master assembly tools. Results thus attained have been quite satisfactory, but not as economical as could be expected, because the tooling dock itself is a universal master which can save the cost of intermediate tooling if used exclusively to fabricate production jigs or fixtures.

After the first tooling dock was developed, it was customary to use third-dimensional fittings on transverse straightedges for the purpose of mounting index templates which had tooling holes for the alignment of formers as the latter were assembled

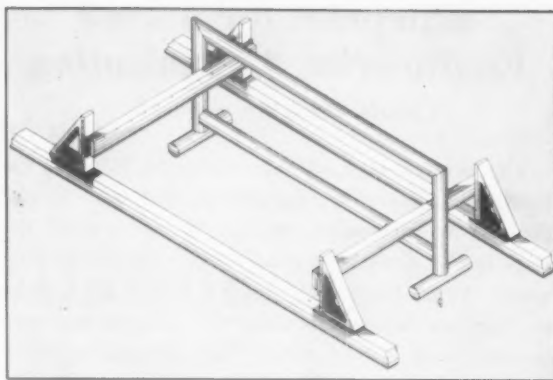


Fig. 6. This schematic diagram shows how a tooling ways setup is used in place of a master tooling dock where it is desirable to position formers on a relatively small picture-frame.

with jig or fixture structures. In addition to being somewhat expensive to fabricate, index templates required a fairly long positioning cycle and limited the usefulness of a dock installation to operations involving the simplest types of assembly tools.

Therefore, considerable money is now being saved and many unprecedented positioning operations are being accomplished by using locator plates in place of index templates in the operation of master tooling docks. Locator plates are rectangular layers of steel, each having a single tooling hole. The tooling hole in each plate represents the third dimension in space when it is aligned with the fitting on a transverse straightedge by means of a dowel pin, and the base of the plate is directly mated to a fixture frame within the dock. When all tooling points have been established by positioning and attaching locator plates for a given assembly tool, the jig or fixture is removed from the tooling dock and formers are accurately mounted on the tooling structure by aligning tooling holes in the locating elements with holes in the locator plates.

Incidentally, while collimator and telescope facilities are not considered as reliable as a tooling dock for actual three-dimensional positioning operations, it is interesting to note that optical instruments are being used where tooling docks are available to check the alignment of straightedges in one or two dimensions and to toolproof dock-set jigs or fixtures. See Fig. 5.

Several low-cost versions of the tooling dock have been developed for positioning operations which can be accomplished in limited work areas. See Fig. 6. Typical of these is the tooling ways set-up, whereby two triangular members are vertically mounted on two longitudinal straightedges so as to provide a means of support for a transverse straightedge. This saves the cost of an expensive foundation and steel superstructure without necessitating a substantial loss of dimensional accuracy in the fabrication of assembly tools, since the tooling-ways unit is functionally the same as a tooling dock.

Blueprint for a Tool Engineering Organization

(Continued from page 101)

The project engineer introduces the job into the product engineering department where it is put through an exhaustive analysis to iron out all the bugs in the design, especially from the production angle. Alterations are handled through the project engineer as liaison between this department and research and development. The project engineer at this time is also in constant contact with the executive tool engineer.

After the design has reached a nearly final stage, it flows to the process engineer for a thorough processing which may still include the original design as a comparison with the proposed changes.

From here it goes through the manager of manufacturing engineering to the estimating department, to the manager of standards engineering. A complete estimate is prepared and sent through proper channels to the comptroller for his approval and to start the procurement of the necessary appropriations.

It will be noted here that the flow chart has been simplified and eliminates the flow from estimating to executive tool engineer through the factory manager to comptroller. It must be remembered that

the project engineer is contact man on the project and that he represents and acts for the executive tool engineer.

The comptroller, after completion of his paper work functions, presents the completed project to the general manager and the cycle starts again. The approved project again goes through the factory manager to the executive tool engineer and thence to a complete analysis and processing by the combined efforts of the manufacturing and standards engineering departments.

A glance at the organization chart (Table II) at this point will show why these two divisions and all their various functions are called into play at this point. Product design changes, if not too extensive, may go back to the chief engineer for new drawings, but could and sometimes are produced under the supervision of the product engineer.

Again, new drawings are presented to the chief engineer and flow through the factory manager to the executive tool engineer where the process dictates new orders for machinery and tools, and tool design for the first time enters the picture.

The balance of the process is obvious with one exception. Plant layout, long a neglected step-child of plant engineering, is included under the manager of standards engineering and covers complete plant layout up to the point of placing physical equipment in the shop.

Influence of The Tool Engineer on Machine Tool Design

(Continued from page 105)

cutter standards, drill standards and many others, and the entire movement was known as the Joint Industry Conference or JIC.

Most of the larger companies, whether represented in these committees or not, accepted the results of the JIC sub-committee standards, and requested machine tool builders to abide by such standards in machine tools being supplied. While such a transition was bound to bring hardship to some extent to some machine vendors, the hardships were temporary and the advantages resulting far out-shadowed the inconvenience of the transition.

These standardizations brought about through the acceptance of JIC efforts have played a big part in the changing of products resulting from improvements or model-change. The overall costs of product model change has been greatly lessened through the use of JIC standardization.

At one time, when all existing shops were com-

paratively small, a model change-over could be accomplished without too much difficulty. In the present day mass production and enormous activities, a model change, though comparatively small, may involve millions of dollars and require thousands of man-hours. A model change must be justified by sales analysis, time study for amortization review, and the availability of man-hours and material to accomplish the change-over. Once a decision is made to change models or manufacturing procedures, the process engineers go to work to write up a sequence of operations, and determine the machines and tools to be used.

At this point, the tool engineer or designer determines the extent of change necessary to adapt the existing equipment to the new model. However, in many cases, adaptation proves unwise and impractical. Where new units are determined necessary, the tool engineer must design this equipment according to the latest standards, and embody features to equal or surpass the performance of the superseded tooling. Design engineers have contributed intangible benefits to modern manufacturers. In fact, few people take the time to realize just how big a part the designer plays in bringing into reality the new machine tools and other products that are heralded as the creations of the century.

*A Tool Engineer study of tooling practice
and methods in tooling and production
during the forthcoming biennium*

3. Materials Handling

By **A. F. Murray**
WORKS MANAGER
ELECTROLUX CORPORATION

PLANT LAYOUT and material handling engineers are and will continue to be required to provide equipment for new defense products in new plants, and to adapt old plants and equipment either wholly or partially to new defense products and, as a consequence, rearrange and condense capacity for civilian products.

They must also modify and adapt equipment and methods as required to use alternates for scarce materials.

Labor Supply is a Factor

Steadily increasing unit wage rates, possibility of labor shortages and the desirability of attracting personnel by providing for reduced physical effort, and better cafeteria, locker and washroom facilities are some of the problems to be faced.

More attention must be given to planning of layout, tooling and handling facilities to permit greater use of a higher average age level among new employees as well as handicapped workers and a greater percentage of women workers.

In many of the large completely new defense product plants which are building, to be main-

tained on a standby basis, construction and heavy machine tool procurement will take so much time that, as other construction proceeds, optimum layout can be planned and material handling equipment procured in time to build it in as construction progresses.

Conversion Presents Special Problems

In conversion layouts speed is usually essential, as is orderly planning to minimize temporary unemployment and loss of trained operators for the new setup.

Close cooperation between operation planning, machine assignment and procurement, tool design and purchasing and the plant layout and material handling men is necessary for best use of facilities available.

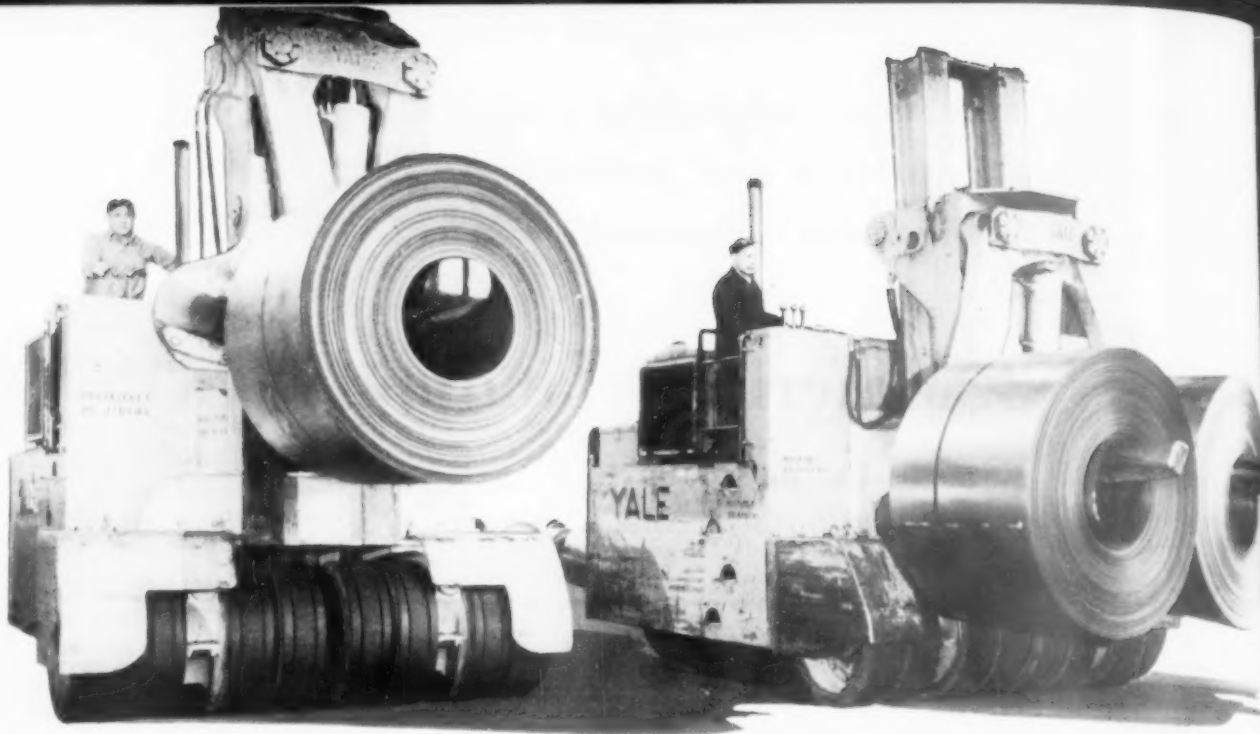
Overall cost will often be less by using existing and simple equipment and more direct labor rather than trying to write off more efficient higher cost equipment and tooling having long delivery time. This will be particularly true for a large portion of the defense contracts being issued. Proper dispersal of orders and use of many smaller plants as subcontractors thus simplify layout and material handling problems for much of the defense output.

Big, New Basic Industry Layouts

Of more than passing interest are such breathtaking projects as the new Fairless steel mill with plant layout involving everything from ore and coal docks to finished steel, and the layout of small towns, or of a new aluminum plant starting with a huge dam and hydro-electric plant in British Columbia, or the new aluminum extrusion plant of Reynolds Metals, with gigantic hydraulic presses of 8,000 and 12,000 tons capacity, the larger unit weighing over three million pounds and being 250 feet long.

Fig. 1. Trucks are an important item in materials handling. Below is a small model while on the next page is shown the other extreme.





Such heroic concepts of production planning will give the chance of a lifetime to a few engineers, but are illustrative of what can happen to material handling and plant layout when design engineers start working from the end product back to production equipment with tremendous output and a bare site.

Mostly from here on plant layout and material handling will be discussed from the tool engineers' point of view. What the engineer can contribute to good plant layout and the trends in material handling which will assist him in tooling for accurate, low cost, and rapid production will be considered.

Dual Purpose Plant Planning

If, as seems to be indicated by the logic of events, there is to be a long term program of "both guns and butter," more and more men will be making plant layouts and material handling plans for the dual-purpose plants outlined by Mr. Charles E. Wilson, of General Motors in his recent article "Preparedness as a Continuing Policy". At Electrolux some progress has been made along similar lines. Special sections of the plant are assigned to assembly and test operations on defense products, under general assembly supervision, with similar special sections in each machining and fabricating department. Here skilled supervision and setup men and a nucleus of trained operators are available to provide for fluctuating demands of both military and civilian goods.

For many plants military production is the same, or with only slight modifications, as for the normal product and only an intensification of the usual urge to better methods and equipment is indicated.

In either case, having determined the method and the machine, the engineer now must get the material to and from the process as quickly as is consistent with quality, and close attention must be given to minimize interference to flow of material by inspection procedure. Quality control and patrol inspection on the job, as well as design and layout of machines and operations for automatic inspection by the act of placing into the succeeding fixture or die, can materially reduce material handling and speed up the production cycle.

In processing materials with high scrap ratios, a determination should be made as to waste removal methods, since removal time of scrap can materially decrease productive machine time. There is an increased present-day emphasis on waste salvage, but efficient plant layout has always provided for efficient waste removal if only for value as salvaged material.

Determining Type of Material Handling

There must necessarily be a wide variety in size and weight in industrial products and this variation is the determinant for mechanized handling.

Insofar as loading and unloading is concerned, this determinant may be the size or weight of the product or in some cases the sex of the operator. As a logical corollary, there should follow an analysis of preceding and following travel for operations, departments and buildings to indicate the proper extent of the mechanical handling.

If this involves mechanical equipment, consideration should be given to future usefulness and, if conveyorization is indicated, the type should be studied for future utility and drive capacity.

Fig. 2 top, shows a crane operator operating a bar handling device. Materials handling equipment is necessary at the working place, Fig. 2, center. At the bottom, Fig. 3 illustrates still another lifting device carrying a conveyor belt about to be weighed before shipment.

Overhead Conveyors are Storerooms

Finishes, fragility, sensitivity may indicate the use of overhead carriers, and the trend is to increasing use of them. As these are comparatively expensive, some thought should be given to the universal or convertible carrier in preference to compartmented carriers. Chain size will be determined by load weight of product and building characteristics, as will required vertical and horizontal curves and takeup sizes. With building costs high and construction restricted, it has been found that the overhead conveyor as a traveling storeroom and as a conservor of factory floor space is of tremendous value.

Belts and Rollers

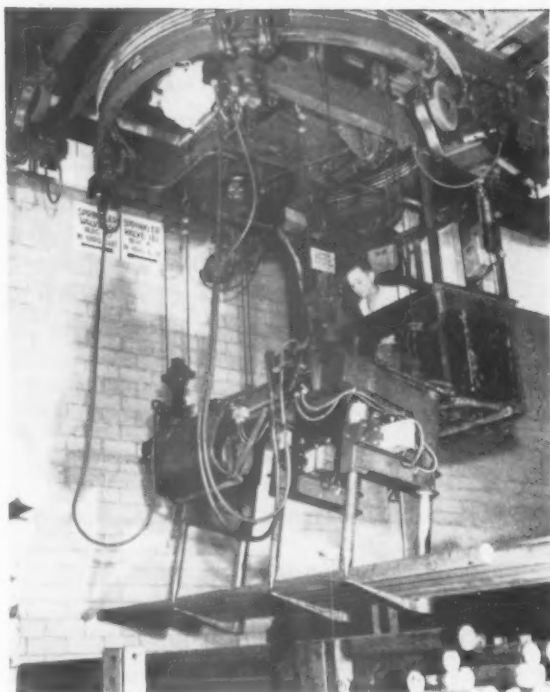
Belt conveyors are built in such wide ranges that specific requirements should govern their selection. But if, as is usually the case, a supplementary roller conveyor is indicated, this roller conveyor can be used in conjunction with belt setups.

A considerable quantity of portable "roller skate" conveyor is a distinct asset for any plant and will invariably repay investment in temporary or emergency layouts and, apart from the processing operations, in receiving or shipping. Should a process strictly concerned with machining not seem to warrant any expenditure for conveyor, such intra-plant use may be found which will justify a short-term conveyor setup on machining. The adaptability of such equipment justifies stocking a reasonable amount of it, just as an assortment of drills and reamers and standard milling cutters is carried in the tool crib.

Simplification is an Opportunity

Simplification of individual operations or installation of more modern equipment gives the opportunity for better layout practice and more efficient material handling, but does not in itself necessarily provide it. A continuing study of the overall plant layout and material handling problem, with more and more use of three-dimensional layouts kept up to date and forecasting a program of long term improvement will give handsome returns.

The operating conditions of the last decade, and the evident necessity of a continuing policy of preparation for any eventuality during an indefinite period of time must lead, more and more, to multi-purpose plants with a wide range of material handling equipment from fork trucks to ball transfers and the physical layout to convert with minimum readjustment.



A Tool Engineer study of tooling practice and methods in tooling and production during the forthcoming biennium

4. Metal Cutting

By A. O. Schmidt

RESEARCH ENGINEER
KEARNEY & TRECKER CORPORATION

PRODUCING AIRCRAFT and weapons at this time in the same way and with the machine tool equipment of World War II would put the United States at a disadvantage. Aircraft design and structures have been developed to such an extent that completely new manufacturing methods and machine tools have become necessary. Machine tool designers, tool engineers and production experts have been highly challenged by the progress in aircraft design and performance requirements.

Manufacture of the integrally stiffened wing, which has been adopted for jet planes as well as for large transport planes, has demanded a new type of milling machine. By milling a self-stiffened panel out of a large slab of high-strength aluminum alloy, hundreds of hours of riveting time have been eliminated; and this one part replaces numerous small parts which previously had to be assembled. The new milling process is employed for both small and very large workpieces. It is comparatively easy to adapt to components of special configuration when only a few experimental parts are to be made because it has fewer limitations than forging, extruding and die casting.

Because of the pressing requirements of the Air Force at the present time and of the still greater demand in the event of an all-out war, provision for versatility and speed of production has been made in these new type milling machines used in making lighter but stronger aircraft structures. While during the last war the development of milling machines was influenced by the general application of carbides to the machining of steel and aluminum, the emphasis has now been placed on speed in production of complex workpieces. For milling parts out of thick plate or forged aluminum alloys, high feed rates are incorporated in machines which are controlled by electronic, hydraulic and pneumatic de-

vices for efficient, automatic operation. Machines with tracer control had formerly been developed and used mainly for machining steel dies. However, these new machines designed primarily for manufacture of aircraft components have greatly increased feed and speed rates together with a high degree of accuracy at high speeds, and thus higher productivity in addition to other advantageous features.

Giant Skin Mill

This trend is illustrated in Fig. 1 by the Giddings & Lewis skin mill which was developed jointly with the General Electric Company for the Lockheed Aircraft Corporation. The machine is the largest of its kind, having a work area 10 feet wide and 34 feet long, with a maximum metal removing capacity of 600 cu in. per min. Three water-cooled, 100-hp Onsrud milling heads are tracer-controlled by a hydraulic circuit, while the lefthand head is controlled electrically. This machine operates with a speed range from 1200 to 3600 rpm for two heads, and 2400 to 7200 rpm for the third. A stepless feed

Fig. 1. Giddings and Lewis skin mill installed for production in Lockheed's Hall of Giants.



range for table and heads from $\frac{3}{4}$ to 150 ipm is provided. The table is driven by a 20-hp motor. A conveyor belt carries chips from the work area of the machine, subsequently depositing them on another conveyor which removes them to a storage space outside the building. A bridge permits the operator to survey the job and to pass from one side of the machine to the other. See Fig. 2. The control panel can be moved along a rail into a convenient operating position. A vacuum base, together with mechanical side clamps, serves to hold the workpiece flat on the table, thus eliminating special fixtures in many cases. Electric cables, hydraulic, water and air lines have been arranged on reels so that they will not encumber the job operation. This machine is now installed on the production floor in what is known as the "Lockheed Hall of Giants", together with many other newly developed machine tools. After initial trial runs and testing, see Fig. 3, it is now also producing wing sections 32 feet long and 4 feet wide for the Super Constellation.

The Onsrud Sparmiller which was widely used in aircraft plants during the last war has been further developed for automatic contour milling. Motors are mounted and controlled in such a way that a follower will guide each cutter automatically. The bed can be supplied in sections or units, and machines up to 90 feet in length have been built. Cutters are guided under pneumatic pressure by appropriate profile bars, thus permitting many types of airplane parts to be machined to a desired shape or contour with an accuracy within 0.001 to 0.003 inch. The Onsrud automatic contour machine has two vertical and two horizontal water-cooled heads

of up to 60 and 100 hp, respectively, running at 10,800 and 3,600 rpm. See Figs. 4 and 5. The carriage on which the cutter heads are mounted travels back and forth on the bed at feed rates from 2 to 220 ipm, thus accommodating either roughing or finishing operations. Mounted in the center of the bed is a conveyor screw which moves chips into the escalator buckets of a conveyor at the end of the bed. The same company has also built a combination router and skin mill which will cut longitudinal tapers combined with routing to a template. The heads will change or reverse direction without hesitation, which eliminates idling in the workpiece material, thus preventing both dulling of the cutters and marring of the workpiece. The power feed can be increased up to 140 ipm.

To mill the many smaller parts of aluminum and magnesium alloys which are required in airplanes and engines, standard milling machines with universal features have been developed by the Kearney & Trecker Corporation. These milling machines have combined the features of aluminum milling and steel milling machines. The cutter is driven by a water-cooled motor mounted directly on the cutter spindle. The table is of standard design mounted on a knee to utilize the inherent versatility of the knee-type machine. Spindle speeds of the Onsrud heads go up to 7200 rpm and feed rates from $\frac{3}{4}$ to 180 ipm with a rapid traverse rate of 300 ipm are provided. This machine is available with either a horizontal or vertical spindle mounting, monolever table control, back-lash eliminator, and arbor supports equipped with anti-friction bearings.

Sliding-head vertical milling machines with electric eye tracer control for contour milling are also

Fig. 2. Giddings and Lewis skin mill has a bridge which permits the operator to cross from one side of the machine to the other.

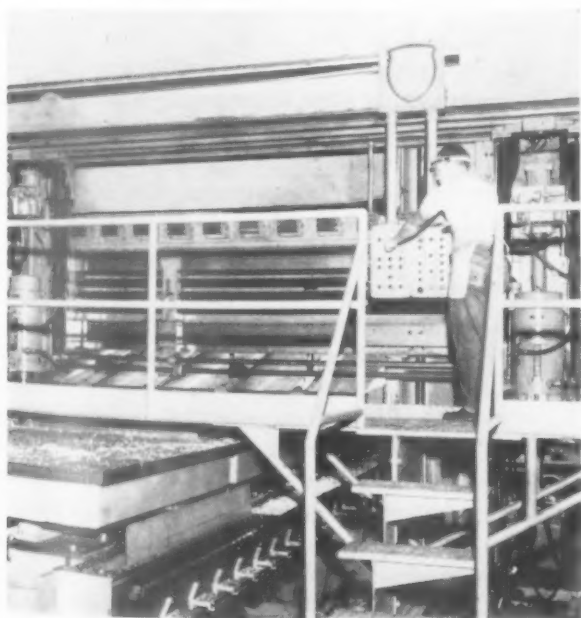
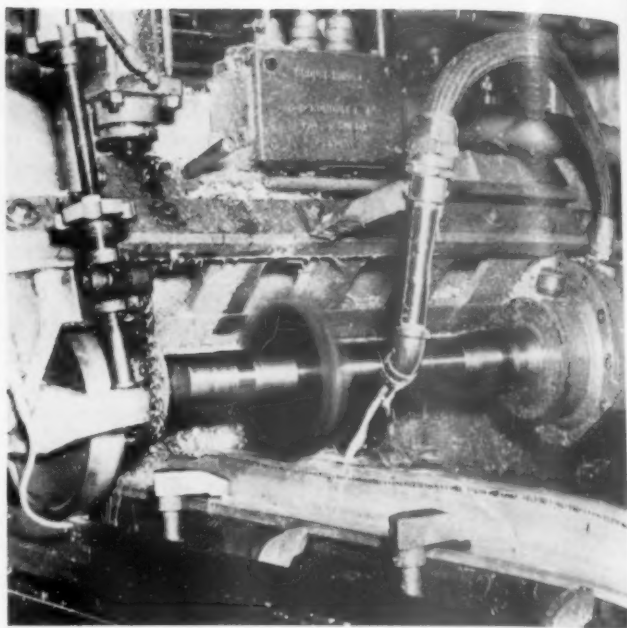


Fig. 3. Tool engineers and production experts checking skin mill during trial runs before it is finally placed in operation.





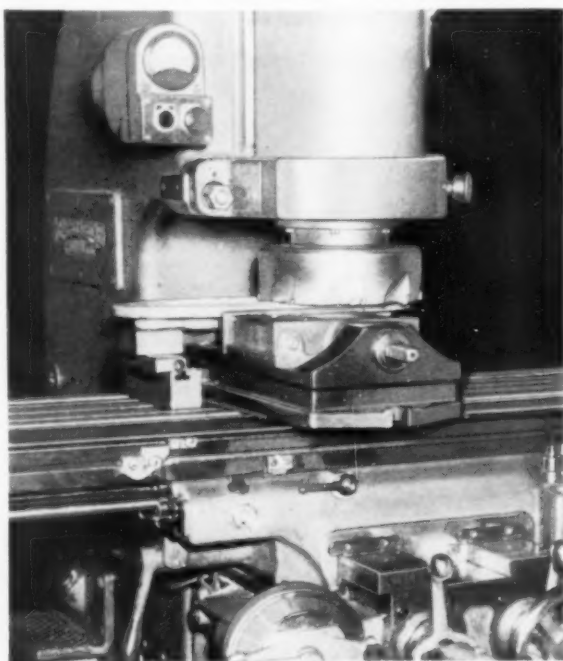
Fig. 4, left, shows a contoured spar cap being milled on an Onsrud machine in the Lockheed plant. Fig. 6, right, is a picture of a knee-type



aluminum milling machine cutting an aluminum alloy cover at a cutting speed of 7,000 fpm and a feed of 180 ipm.

available. See Fig. 6. Here again the requirements of the aircraft industry have been taken into consideration. Since most of the workpieces are expected to be magnesium or aluminum alloys, a spindle-mounted, water-cooled Onsrud motor, delivering 5 hp at 3600 rpm or 10 hp at 7200 rpm, can be supplied in addition to the standard low-speed range of 150 to 1000 rpm. The tracing feed range is from 0 to 100 ipm. Any opaque material can be used for the template and the electric eye will follow its edge or one side of 0.020-in. wide transparent line

Fig. 5. Horizontal cutter head milling a spar cap on an Onsrud automatic contour machine.



inscribed on enamel-coated glass. The machine has the appearance of a standard vertical knee-type milling machine, except for the addition of a glass platen for the template and a new gear case on the front of the knee. A separate cabinet houses the electronic control equipment. The machine can be used as a standard mill with the tracing feeds blocked out, which then permits the use of regular feeds.

These are developments in the milling machine field which have been accelerated by the present international situation and should assist in making our production capacity in aircraft, but also in other industries as well, adequate to supply the simultaneous demands of the civilian economy and the rearmament program.

Other current machining problems include the milling of armor plate, titanium alloys, stainless steel and those alloys with high strength properties at elevated temperatures. In most cases, milling machines designed by incorporating the shop experience of the last war and the findings of metal cutting research, have proven adequate for working these hard-to-machine alloys.

It is encouraging to remember that this country was started on its way as the leading industrial nation 150 years ago when Eli Whitney initiated mass production of interchangeable parts in the manufacture of a large number of weapons for military purposes. The reported developments of machine tools and production procedures which are now primarily being utilized in our military preparedness program can be expected to greatly benefit civilian economy in all the metalworking industries in the near future.

A Tool Engineer study of tooling practice
and methods in tooling and production
during the forthcoming biennium

5. Tool Materials

By Lester F. Spencer
CHIEF METALLURGIST
LANDERS FRARY & CLARK

WITHIN THE PAST twenty years, the use of carbide has grown to such an extent that today in many machine tool applications it replaces the highly alloyed tool steel compositions. There will be further expansion of its use in the future, not only due to the technological advancements within this field, but also because of the increasing need of tool materials to withstand successfully the higher operating temperatures present during machining. In the latter instance, the development of those highly complex alloys used in jet aircraft manufacture has focused attention on the carbides as cutting tool materials because of their ability to retain both strength and hardness at much higher temperatures than previously experienced with the alloy tool steel compositions (consult Fig. 1).

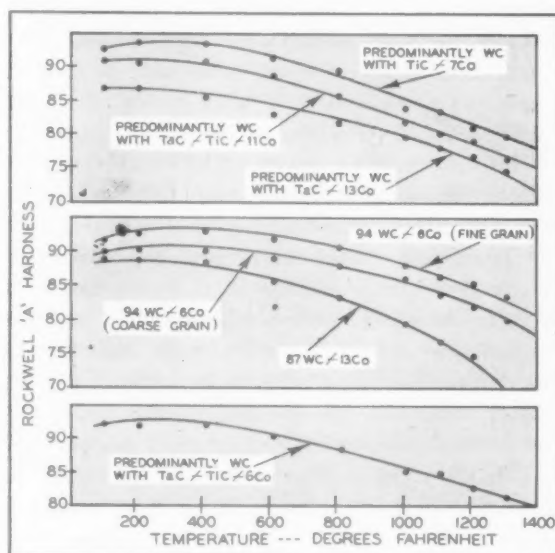
The success of the carbides in the past as a cutting tool material has resulted in modified equipment designs so as to permit the more extensive use of this material. A similar pattern of achievement in the use of carbides within the press metal field involving drawing, blanking, forming and piercing has been started and will undoubtedly continue to expand in the very near future. One of the most outstanding advancements that has been made in the carbide field is the development of compositions which may be successfully employed in applications involving shock. Thus, this has made possible the use of carbides within the mining field where rock drills, whose operation is primarily a hammering action, having inserted carbides, are being successfully employed.

The variety of compositions available and the resultant variation of applications is positive proof of carbide's acceptance as a tool material. In addition to the standard tungsten carbide grades, the complex carbide types which also include either titanium, tantalum and/or columbium carbides, are

well known for their crater resistance. A few of the more outstanding examples in the employment of carbides are as rings and punches in the drawing of sheet metal; as carbide tipped circular saw blades; as carbide tipped boring tools in the cutting of stringy materials such as aluminum, magnesium, copper, bronze and cast iron; and its use as carbide inserts in planer tools.

A noteworthy advance in tool design is the mechanical holding of the carbide element. The principal advantage gained is freedom from thermal strains which are ordinarily present where brazing procedures are employed to bond the tip to the shank. This phase of carbide tooling is and will be used more frequently, especially in instances where multiple tooling is used. In this instance, the use of a symmetrically shaped carbide insert will

Fig. 1. From the curves below, it can be seen that tungsten carbide has highly desirable characteristics for cutting at high temperature.



permit the use of multiple cutting edges by merely indexing the carbide insert without disturbing the original set-up. Full production from an initial set-up can thus be obtained before resharpening of bits is required.

The expansion in the use of carbide has resulted in problems such as the development of a suitable bonded wheel for grinding. Thus, the diamond abrasive wheel is more frequently used for finish grinding with either the resonoid or vitreous bonded wheels preferred; however, for some purposes, the metal bonded wheel may be used. Special silicon carbide wheels are employed for rough grinding. These wheels have a soft bond which permits dulled abrasive particles to be readily removed from the matrix. Unfortunately, coincidental with the increased use of carbides, a shortage of diamond abrasive wheels exists. Thus, developments along this line where service is comparable to a diamond type wheel would be a worth-while contribution. The program involving the recovery of the valuable tungsten constituent from discarded tungsten carbide tools has been reported to be successful, thus augmenting the available tungsten supply which is so vital in the preparedness program.

Titanium Carbides

Of recent origin is the development of the cemented titanium carbides having both tantalum or columbium carbides as auxiliary additions and either nickel or cobalt as the binder. The compositions will vary in accordance with the specific application. The principal characteristics of this class of material are its light weight, resistance to thermal shock and oxidation at elevated temperatures and its strength at high temperatures. This class of material may find possible tool applications at temperatures where compositions containing tungsten carbide oxidize rapidly (1400 deg F and over). Within this field it may be also desirable to mention the introduction of the new chromium carbide composition, the properties of which make it suitable for high temperature applications. This composition is so new that, other than as used in gages and check valves, little is known of its potential within the industrial field.

The future advancements of cemented carbides will be dependent upon the cooperative efforts of both the carbide manufacturer, the tool producer, the equipment manufacturer and the consumer. Where this has been done in the past, improvement in the use of carbides has resulted and the continuance of this practice will undoubtedly broaden the use of carbides in the future.

Ever since the introduction of the first commercial molybdenum high-speed steel composition in 1932, the constant improvement of either analysis types, handling procedures and/or heat treatment facilities has led to the universal acceptance of

this type of tool material. The development of these alloys where molybdenum has replaced all or part of the tungsten within the analysis has made it possible to extend the potential usage of this cutting tool material. It is also reasonable to expect that the usage of this material will definitely increase in the future. Of interest are shipment figures given for high-speed steels. These values were obtained from one of the leading tool manufacturers and it is reasonable to expect that the trend indicated hold true within the entire industry. The values given are for the year 1951 as compared to the last quarter figures for the same year, thus:

Steel Type		Shipments, 1951	4th Quarter Shipments
T1	(18-4-1)*	15.0 percent	7.0 percent
M2	(6-4-2-5)*	51.0 percent	62.0 percent
M1	(1-4-1-9)*	20.0 percent	20.0 percent
M10	(0-4-2-8)*	7.0 percent	7.0 percent
Miscellaneous		7.0 percent	4.0 percent

*Type represents approximately the percent each of tungsten, chromium, vanadium and molybdenum.

Representative compositions within this class of material are given in Table I, each analysis type having a definite niche in the machine tool field. Thus, type 2 composition (M4) has excellent resistance to abrasion and is used with considerable success in the machining of cast iron, brass, aluminum and plastics; type 4 composition (M10) has excellent cutting properties combined with a higher toughness value than that of the other molybdenum high speed steels; and type 3 composition (M2) is the most frequently chosen since it is an ideal compromise between a tungsten and a molybdenum high-speed steel. This latter analysis is generally accepted as being equal to the standard 18-4-1 analysis (T1) and proof of its acceptability is its selection as a standard type by several large automotive companies. In addition, these molybdenum high speed steels can be surface hardened in much the same manner as the tungsten types of high-speed steels. Both nitriding and carburizing procedures are used to improve abrasion resistance of punches and dies.

TABLE I—REPRESENTATIVE COMPOSITIONS OF MOLYBDENUM HIGH-SPEED STEELS

No.	Type*	Chemical Composition Percent						Comparable AISI SAE Nos.
		C	Co	Cr	Mo	V	W	
1	6-5-4-2+8	0.90	8.0	4.0	5.0	2.0	6.0	M36
2	5-5-4-4	1.30	—	4.5	4.5	4.0	5.5	M4
3	6-5-4-2	0.80	—	4.2	5.0	2.0	6.5	M2
4	0-8-4-2	0.85	—	4.0	8.0	2.0	—	M10
5	1-9-4-1	0.80	—	3.8	8.5	1.2	1.5	M1
6	6-6-4-3	1.15	—	4.0	6.0	3.0	6.0	M3

*Type represents approximately the percents each of W, Mo, Cr, V + Co.

A similar substitution program involving the use of molybdenum as a replacement for tungsten will undoubtedly occur within the hot-worked steel compositions. Emphasis is being placed upon those compositions within this group that have minimum tungsten and in some instances new compositions reflecting this substitution program have been introduced to the field. Very satisfactory progress has been reported by a leading tool steel manufacturer on a molybdenum type hot-worked steel, the composition of which contains approximately 6½ percent molybdenum, 1½ percent tungsten, 3½ percent chromium and ½ percent vanadium. This alloy comes in two grades, one having approximately 0.30 percent carbon and the other having approximately 0.55 percent carbon, both of which are reputedly as good or slightly better than the standard hot-worked compositions containing appreciable tungsten.

Although water hardening tool steel compositions will always have a definite place within the tool steel field, there is a definite trend in the use of both the oil and air hardening grades, with the former types being used more extensively for complicated die sections. Discrimination in the choice of tool steel composition is becoming more important since the choice of water hardening grades for borderline cases has resulted in excess labor charges in both preparing the die for heat treatment and finishing for ultimate usage. Every precaution must be taken to prevent possible breakage during quenching.

Of the oil hardening grades, the compositions listed as 5, 6 and 7 in Table II have recently been developed to give a combination of better hardenability and abrasion resistance than either types 2 or 3, combined with a lower austenitizing temperature and better ease of processing than any of types 8, 9, 10 or 11. The lower austenitizing temperature means less decarburization and scaling during heat treatment. Of interest is the increased use of 'Graph-Mo' a graphitic type oil hardening composition (type 4, Table II) which is replacing both the low manganese and high manganese oil hardening types (types 1 and 2, Table II). Using 1946 tonnage figures as a base, a 500-percent increase in tonnage occurred during 1951 and it can be assumed that there will be a continued increase in production of this type of tool steel. The inclusion of 'Graph-Mo' as a standard oil hardening composition in such specifications as produced by SAE, Ford Motor Co., General Motors, etc. is definite proof of its acceptability. Its advantages of good machinability, longer wear life on most applications due to the excess of carbides within the structure, and the fact that graphitic pockets on wearing surfaces which retain a certain amount of the lubricant, has made it a popular tool steel for forming, piercing, per-

TABLE II—TYPICAL COMPOSITIONS OF SEVERAL NON-DEFORMING OIL and AIR HARDENING TOOL STEELS

Type	Chemical Composition					Percent				
	C	Mn	Si	Cr	V	W	Mo	Co	Ni	
1	0.90	1.20	0.25	0.50	0.20*	0.50				
2	0.90	1.60	0.25	0.35*	0.20*		0.30*			
3	1.00	0.35	0.25	1.20			0.30			
4	1.50	0.30**	0.85	0.20			0.30			
5	0.70	2.00	0.30	1.00			1.35			
6	1.00	2.00	0.25	2.00			1.00			
7	1.00	3.00	0.25	1.00			1.00			
8	1.40	0.30	0.25	12.00	0.50*		0.80	3.50		
9	1.00	0.50	0.25	5.00	0.50*		1.10			
10	1.50	0.30	0.25	12.00	0.50*		0.80			
11	2.25	0.30	0.25	12.00	0.50*		0.80			
12	1.00	0.30	0.25	12.00	0.50*		0.80		1.00*	

*Optional element; steels have found satisfactory application with or without the element present.

**On cross sections under 4½ inches manganese will be approximately 0.40 percent; on cross sections 4½ inches and over, manganese will be approximately 0.90 percent.

*Optional element; steels have found satisfactory application with or without the element present.

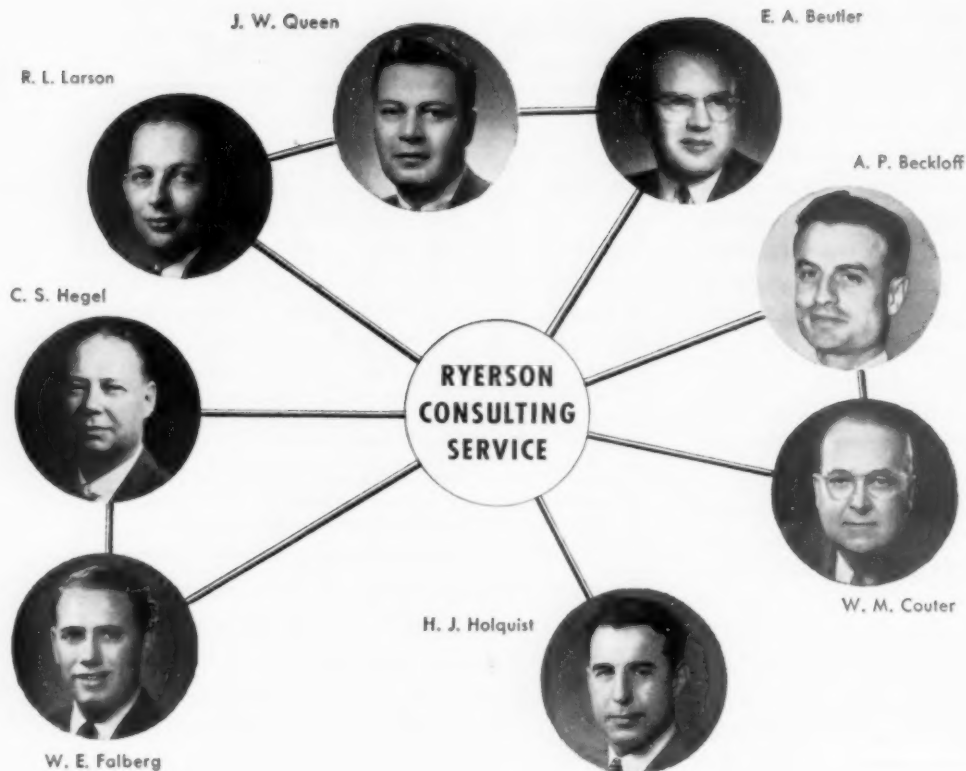
**On cross sections under 4½ inches manganese will be approximately 0.40 percent; on cross sections 4½ inches and over, manganese will be approximately 0.90 percent.

forating and blanking dies. It is also used to a large extent for gages; for this purpose the standard cold treatment cycles are required.

The high carbon-high chromium steels (types 8, 10 and 11, Table II) will undoubtedly prove as popular in the future as they have in the past. The chief advantages of these compositions are their high abrasion resistance and high hardenability. In regard to abrasion resistance, a recently developed tool steel composition containing approximately 2.40 percent carbon, 12.5 percent chromium, 4.0 percent vanadium and 1.0 percent molybdenum is being used extensively for severe service applications involving sandblinger liners and lamination and blanking dies.

More development work within the tool steel field will undoubtedly be done in the future since the field is not only highly competitive, but also many restrictions have been placed on such critical materials as tungsten, cobalt and nickel. This entire picture as to availability of alloy materials may change very rapidly in accordance with international developments. This is particularly true where the alloy in question is imported either in the form of an ore or as a refined material.

The use of rubber as a tool material will be on the increase, especially in the forming and drawing of shapes which are of moderate production quantities. Such established processes as the 'Guerin' and 'Marform' procedures have given impetus to the use of rubber as a die material. The advantages are low cost of tooling, good limits of formability and fairly good tolerances. Although these procedures were initiated within the aircraft industry where continual change of design and/or limited production was the rule rather than the exception, it has gained wide recognition in other fabricating industries. The proof that rubber as a tool material is advancing is its use on a number of new developments involving the forming of sheet metal.



Bring Your Steel Problems to These Men... at ASTE Booth 147

Here are some of the Ryerson steel specialists you'll meet at the Tool Engineers' Show in Chicago. Each is an expert in his field. Together they make up a consulting service that's ready to work for you.

What is your steel problem? If it concerns the application, selection or processing of carbon, alloy or stainless steel—tubular products or tool steel, these men can help you find the right answer. They can suggest practical alternates for restricted steels. Answer your questions on how to heat treat unfamiliar alloys—weld an unfamiliar stainless. Help you on these problems and many more.

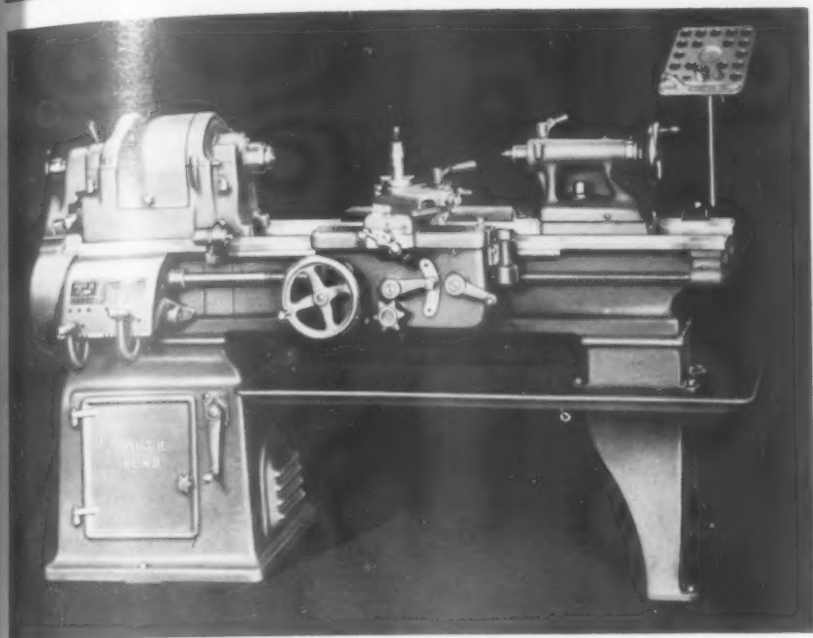
Although a few steels are still in short supply, we can meet most of your requirements promptly from stock. For the complete steel picture, as we see it here at Ryerson, we invite you to write or visit our nearest plant and talk with our men at ASTE Booth 147—March 17 to 23 inclusive.

RYERSON STEEL



JOSEPH T. RYERSON & SON, INC. PLANTS: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI • CLEVELAND
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SEATTLE • SPOKANE

Tools of Today



16-Inch Swing Toolroom Lathe

The South Bend Lathe Works announced a 16-in. swing toolroom lathe. This model has ample capacity for most tool and die work, plus the precision for the most exacting operations on small parts. Regular equipment of the lathe includes handwheel type draw-in collet attachment, telescopic taper attachment, micrometer carriage stop, and thread dial indicator. Conveniently placed and easy-operating controls save time and effort in operating the lathe. Selection of any desired thread or feed is made by shifting two levers on the

improved double tumbler quick change gearbox. Screw threads range from 4 to 224 per in. A powerful multiple disc friction clutch permits engaging and disengaging power feeds instantly.

The motor and driving mechanism are enclosed in the cabinet leg beneath the lathe headstock. When equipped with a 3-phase, two-speed motor, the lathe has twelve spindle speeds ranging from 20 to 945 rpm. Direct belt drive to the spindle for high speeds assures smooth, quiet operation on small precision parts. Booth No. 1216. **T-3-1331**

Optical Tools

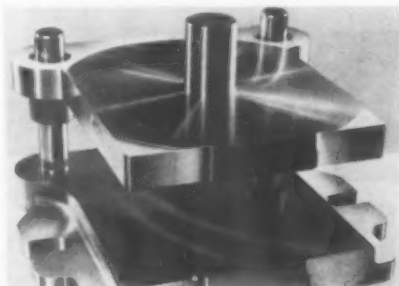
E. T. Griswold Mfg. Co., Wayne, Pa., announce a number of new tools. Two distinct types of alignment telescopes, an optical cam rise gage, a level and a drill Point-Chek gage have been developed during the past year. These, together with an optical dividing head, indexing table, straightedge and Scan-A-Scale, are now available. Booth No. 832. **T-3-1332**

Instruments

B. C. Ames Co., Waltham 54, Mass., manufactures a complete line of instruments for checking and controlling production processes, inspection and quality control. Included are micrometer dial indicators and micrometer dial gages for dimensional checking. Booth No. 605. **T-3-1333**

Die Sets

A series of die sets, including thousands of standard and special units to accommodate any die, is made by the Dandy Machine Specialties, Inc., 2100 South Laramie Ave., Chicago 50. The



company also manufactures a variety of die makers' supplies. A feature of the die sets is the shank welding process used in producing them. Both No. 1610. **T-3-1334**

Thread Roller

The Salvo thread rolling attachment mounts on the cross slide of any automatic screw machine. Threads have been rolled up to 3 in. long. Special cams are not needed for its operation. Pitch diameters can be controlled to 0.0005 in.

Concentricity with other diameters is maintained, and end working tools can also be used in the main tool slide in conjunction with thread rolls on the cross slide. The thread rolls pass over the center line of the workpiece, thus insuring an accurately formed thread as well as very close tolerance. Knurling, and thread rolling can be performed in the same attachment on special jobs. The Salvo Tool & Engineering Co., 26441 Gratiot Ave., Roseville, Mich. Booth No. 352. **T-3-1335**

Induction Heater

Motor-generator type Tocco induction heating machines basically consist of a high frequency generator, suitable transformers and capacitors, and automatic timing controls assembled into complete, self-contained units. Inductors and fixtures, designed to fit the application, are readily and quickly mounted on the basic units or heating stations. The machines are applicable for hardening, annealing, brazing, melting and heating for forging.

Tocco induction heaters are made in nine sizes ranging from 7.5 to 300 kw output and can be furnished in a variety of models and frequencies. Special units of over 300 kw are available. Made by the Ohio Crankshaft Co., 4000 Harvard Ave., Cleveland 1. Booth No. 1425. **T-3-1336**

Trim Die

The Brehm trim die is used in a conventional punch press to trim the surplus stock from shells drawn from sheet metal or other sheet materials. Shells trimmed vary from fountain pen parts to electric refrigerator doors. Stock thicknesses vary from 0.008-in. brass to 7/32-in. steel.

Parts are completely trimmed in one operation with perfectly flat edges except for notched or projecting portions. The cutting of the material is a shear action similar to blanking dies, giving an edge without burrs. Steel Products Engineering Co., Springfield, Ohio. Booth No. 1900. **T-3-1337**

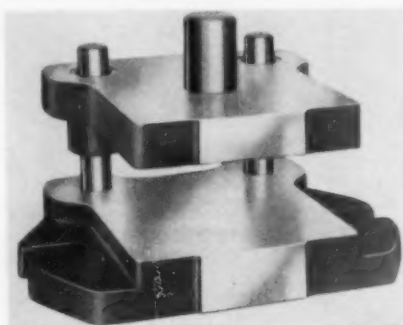
Calipers

Brown and Sharpe Mfg. Co., Providence 1, R. I., are makers of a complete line of small tools, cutters, and precision measuring and gaging equipment.

Included are new micrometer calipers with stainless steel spindle with hardened and ground threads and carbide measuring faces; an electronic caliper gage with adjustable measuring pressure; pumps; arbors, adapters, and collets; permanent magnet chucks; screw machine tools; surface plates; bench centers. Booth No. 1435. **T-3-1341**

Catalog Die Sets

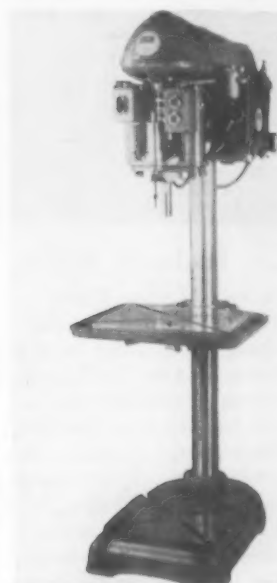
Die sets featuring six major improvements are made by The Product Machine Co., Bridgeport, Conn. Greater



strength is obtained in the new design with every contour planned to keep weight at a minimum while reinforcing all critical areas. One long, smoothly machined rear pad on the punch and die holder assures uniform accurate location of pin and bushing holes. Straight rear pad also allows considerable more layout and marking area on the punch holder, as well as on the smaller die holders. Booth No. 1104. **T-3-1308**

Tapping Machine

This tapping-drilling machine for production work can perform single and multiple tapping, direct from a drill chuck or standard multiple drill head, without employing lead screws



clutches or tapping heads. Absolute and precise control of air power is used to feed the tap through the work.

The machines produce Class 2 and 3 threads in a variety of materials. Drilling operations are performed by removing the taps, inserting drills, and switching out the motor reversing circuit. Beckett-Harcum Co., Wilmington, Ohio. Booth Nos. 1116-1118. **T-3-1343**

Instruments

Precision measuring instruments and tools, dial indicators, precision ground die and flat stock, steel tapes and rules, hacksaws, bandsaws and band knives are produced by the L. S. Starrett Co., Athol, Mass. Booth No. 833. **T-3-1344**

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Republic will be well represented at the A.S.T.E. Industrial Exposition in Chicago. Look for us in Booth #519 in the Process Control Hall.

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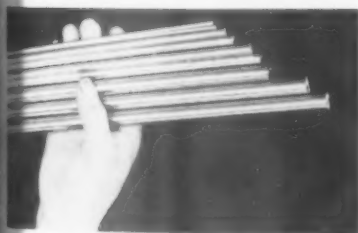
Drill Head

The Dumore drill head is a compact drilling unit 14½ in. long, 4 in. in diameter and weighs 17½ lb. All controls are built in and completely automatic.



It furnishes its own drilling power and generates its own air supply to advance drill into workpiece by means of a rotary compressor mounted on the armature shaft. The Dumore drill head operates from any electric outlet in any position without cumbersome hydraulic feeds and air connections. The Dumore Co., 1300 Seventeenth St., Racine, Wis. Booth No. 404. T-3-1351

HSS Drill Rod



Ace Drill Corp., Adrian, Mich., announces the introduction of hardened and ground high-speed steel drill rod in standard 36-in. lengths. These blanks have the equivalent toughness of conventional tool steel materials yet measure approximately 6 points higher on the Rockwell "C" scale.

Blanks are cut from this treated stock, and centerless ground. These blanks are available as hardened, tempered and centerless ground in diameters from 3/32 to 1 in. or as hardened and tempered only. Booth No. 144. T-3-1352

LET'S TALK FACTS ABOUT FACE MILLS!

"This NELCO solid-brazed, carbide tipped mill is the best tool we've got. We get the most for our money — it's solid, rugged and dependable . . . gives better finishes, higher table feeds and turns out more work between grinds. Boy! It's a Honey!"



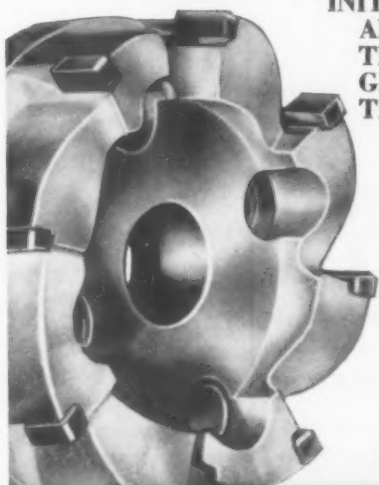
HERE'S WHY...

2 or 3 solid-brazed face mills cost *less* than 1 inserted blade type! The same initial investment provides 1 or 2 *spare* cutters which can be used while grinding the original.

There's less chance of damaging rugged, one-piece solid-brazed type cutters. No moving parts to keep aligned! . . . No loose parts to shatter, to accidentally injure workers.

A **SOLID** tool *has to work to closer tolerance!* It's a fact!

Solid-brazed cutters can be repaired *quickly* when damaged — No costly machined body to be re-worked or replaced. 1 blade for an inserted type cutter costs as much as 3 to 5 replaceable solid carbide cutter tips. The solid-type face mill has up to twice as much usable carbide. **THEREFORE — SOLID-BRAZED FACE MILLS GIVE YOU—MUCH LOWER INITIAL COST — LOWER MAINTENANCE COST — FASTER PRODUCTION — CLOSER TOLERANCES — GREATER SAFETY and LESS DOWN TIME!**



THESE ARE FACTS!...

Solid-brazed type face mills are **NOT GADGETS** . . . they're dependable, accurate, production-proved 1 **PIECE** cutting tools.

Benefit by proving these face-mill-facts on your machines NOW!

See Us at the Tool Show—Booth #410

NELCO TOOLS

*For that Extra
Edge in Production*

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

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Chilling Machine

Sub Zero industrial chilling machines are manufactured by Sub Zero Products, Division of Deepfreeze Dis-



tributing Corp., Cincinnati. Designed to treat metals at temperatures as low as 120 deg below zero, the Sub Zero machines are finding wide industrial applications.

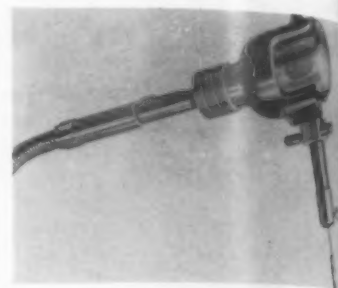
There are three main uses for Sub Zero metal treatment including (1) quick aging or stabilization of steel; (2) speeding of press-fit assembly work; and (3) increasing perishable tool life.

Stabilization of steel, ordinarily requiring years of aging, is effected in hours by Sub Zero treatment. Booth No. 337.

T-3-1361

Die Filing Tools

The Di-Profiler is a complete die filing tool, combining reciprocating, rotating and oscillating action. It does



the complete job from the rough surface to a mirror finish. The Di-Profiler is a power-driven tool that keeps the "feel" of hand filing, at fifty times the speed. It files, hones, polishes, laps, chafes and saws all material, from carbide bits to wood and fiber. It has an adjustable stroke length from 0 to 1/2 in. Nord International Corp., 30 Church Street, New York 7, N. Y. Booth No. 124.

T-3-1362

Lighting Unit

The Miti-Mite magnetic base lighting unit is a portable lamp holding up to 100-watt standard incandescent bulbs and fits instantly to curved or flat sur-



faces. Ball and socket bracket construction permits maximum illumination where needed. The shade is green, rayon-flocked to resist heat and protect user's eyes. The magnetic pull is 100 lb, has fingertip release lever. Made by the Enco Mfg. Co., 4524 W. Fullerton Ave., Chicago 39. Booth No. 610.

T-3-1363

Precision Indicator

Model 145, a precision indicator with jeweled bearings comparable to a precision timepiece, is designed for checking variations in contour, dimension of roundness to 0.0001 in. The instrument is manufactured by the Chicago Dial Indicator Co., 180 North Wacker Drive, Chicago 6, and features their General movement which uses a lever arm instead of a series of gears. Booth No. 511.

T-3-1364

The Tool Engineer

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ROTARY FILES and TOOLS

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1/4" SHANKS

1/2" SHANKS

1/4" SHANKS

1/2" SHANKS

1/4" SHANKS

1/2" SHANKS

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Dimensionair

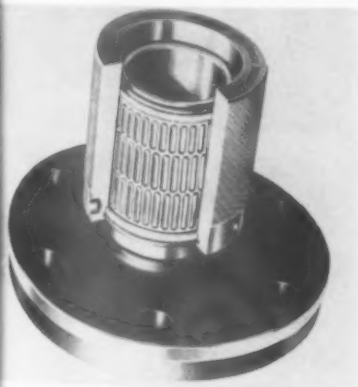
The Federal Dimensionair is one of the newest and most advanced air gages yet put on the market. It has outstanding stability and range and its scale is accurately calibrated throughout its



7½-in. total length. It is of the dial type which is familiar to most users of precision measuring instruments, such as the dial indicator. Its outstanding range of 0.003 in. with magnification of 2500:1 enables the user to not only use the Dimensionair on finished jobs, but to also use the same gage on roughing out jobs, resulting in a great saving in plugs and gages. Federal Products Corp., 1144 Eddy St., Providence 1, R. I. Booth No. 733. **T-3-1371**

Chucking Tools

Scully-Jones announces a line of precision tools used for internal or external chucking of parts and tools during turning, grinding or inspection operations.



The Roll-Lock mandrels, arbors and chucks use a new principle for creating an extremely rigid and accurate centering or shrink fit (often less than 0.0001 in.) which allows transmission of the maximum given torque, thrust and accuracy.

In either method of chucking (external or internal) only rolling friction has to be overcome. With very little turning force on the actuating ring or

cone, tremendous holding pressures are quickly exerted between the Roll-Lock chucking tool and piece part. Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8, Booth Nos. 1511 and 1517. **T-3-1372**

Small Tools

The Federal Machinery Sales Co., 4639 Washington Blvd., Chicago 44, handles an extensive line of cutting tools, abrasives, and die supplies as well as special products. They are also representatives for various machine tool builders. Booth No. 1108. **T-3-1373**

Gear Rolling Fixture

Engineered metal cutting tools are made by the Illinois Tool Works, Chicago. Also available is a gear rolling fixture for checking gears on the production line. The company will supply on request special booklets from a technical library dealing with the various phases of efficient metal cutting tool application and maintenance. Booth No. 1223. **T-3-1374**

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BARNESDRIL MAGNETIC COOLANT SEPARATOR

OFFERS SIMPLE, POSITIVE COOLANT CONDITIONING

For Production and Machine Savings!



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AVOID MACHINE SHUT-DOWNS
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INDICATE A-3-138-1

138

Split-Flange Clamp



The split-flange type of clamp and hose assemblies and related fittings made by the Anchor Coupling Co., Libertyville, Ill., represent a new development in the hydraulic field. They are easy to use, eliminate threaded joints and prevent leaks. A wide selection of sizes is available for use with either clamp or pressed-on type couplings. Booth No. 304.

T-3-1381

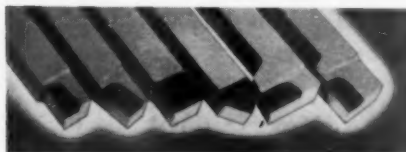
Micrometers

A Swiss micrometer called Imicro permits accurate measurement of threaded bores during and after manufacture. The construction of the screw-thread internal micrometer gives a three-point measuring contact of the feeler-bolts for the actual measurement. These Tesa micrometers are accurate to 0.0002 in. and easily readable to 0.0001 in. Their range is from 0.275 to 8.0 in. Distributed by Size Control Co., 2500 West Washington Blvd., Chicago 12. Booth No. 704.

T-3-1382

Carbide Tools

Firthite standard general purpose tools are made to the designs, style numbers, sizes and tolerances adopted by the Carbide Industry Standardization Committee.



They are stocked in five grades, selected for best over-all general purpose cutting needs. These grades fall into two general classes, one for cutting steel (the "T" series), and the other ("H" series) for cutting all other materials.

In addition to the above standard brazed tools, Firth Sterling manufactures a complete line of standard mechanical tools. Firth Sterling Steel and Carbide Corp., Pittsburgh. Booth No. 725.

T-3-1383

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Putting
Money
In The
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**GAY-LEE
"THINSAW"
CARBIDE TIPPED**

Thin as .030"

**You'll save time and rejects by
using this new "Thinsaw" on pro-
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Eliminates run-outs even on
deep cuts

Thinnesses as low as .030"

Tolerances can be held to .0001"

Available in diameters up to 5"

Circular tip seat gives extra
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Available in any grade carbide

Cuts free of run-out to full depth

Built without hub for close align-
ment in multiple cutting

Write today for catalog.

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INDICATE A-3-138-2

The Tool Engineer

PUMPS

FOR COOLANTS,
LUBRICANTS, AND
ABRASIVE LIQUIDS

PUMPS

POSITIVE DISPLACEMENT
AND
IMPELLER TYPES

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J. I. C. STANDARDS
OR DIRECT
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PUMPS

DEPENDABLE,
ECONOMICAL, EFFICIENT

STANDARD OR SPECIAL,
FOR EVERY MACHINE TOOL
AND INDUSTRIAL USE

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19645 JOHN R STREET
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WRITE FOR CATALOG

INDICATE A-3-139-1

March, 1952

Wet Blast Machine

The introduction of a new wet blast machine with many special features for improved operation and reduced maintenance is announced by American Wheelabrator & Equipment Corp., Mishawaka, Indiana.

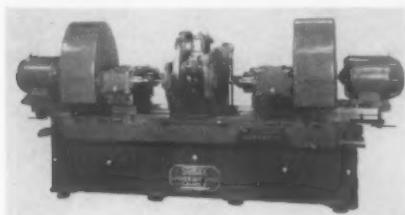


Among the special features in the new wet blaster is a vertical pump for slurry recirculation. It is adaptable to rugged service, and because of its position, it eliminates all suction piping, valves, fittings, and labor for removing them for inspection of the pump.

Abrasive action can be closely controlled by the use of very fine mesh abrasives, so there is no danger of destroying or altering precision-built sections. Abrasive sizes range from 80 to 2500 mesh. Booth No. 1215. T-3-1391

Boring Machine

A Simplex 3U-2Way hydraulic feed precision boring machine with a special three-station hydraulically indexed trunnion is used to precision bore and counter-bore the wrist pin hole in aircraft pistons. The machine is equipped with



four Simplex No. 4 self-contained, automatically lubricated, precision boring heads. A three-station hydraulically indexed trunnion with manually clamped type work-holding fixtures is mounted on the worktable area of the machine. The trunnion is electrically interlocked with the cycle of the machine so that it must be in its proper position before the machine will operate. This machine produces piece parts at the rate of 120 per hour at 80 percent efficiency. Simplex Machine Tool Division, Stokerunit Corp., 4548 W. Mitchell St., Milwaukee 14. Booth No. 508. T-3-1392

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OR DEVELOP
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TO TOOL AND EQUIP YOUR
PLANT FOR THE BEST
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TO GET YOUR NEW
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TO REDUCE YOUR COSTS
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INDICATE A-3-139-2

STAR *Carbon Tool* PERFORMERS

STANDARD

VANADIUM
EXTRA

WATERDIE
EXTRA

EXTRA
HEADER-DIE

EXTRA

SPECIAL



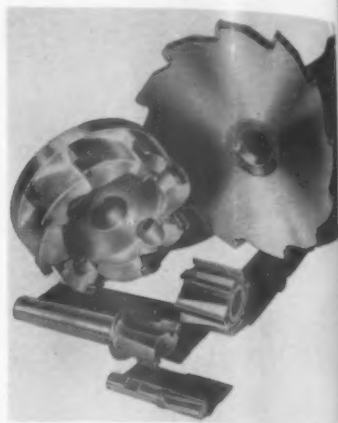
Water hardening steels
with controlled hardenability
for every water hardening
tool steel need.

COLUMBIA TOOL STEEL COMPANY

Main Office and Works - Chicago Heights 3, Illinois
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-140

Carbide Cutting Tools

Nelco carbide cutting tools are production engineered for particular applications. Among them is the carbide Tri-Helix tooth design found in the series 100 slide mills. This design causes chips to fold during cutting, thus



lessening the chances of the carbide tip breaking down at the center. This feature is said to cut down on chip clogging, make for cooler cutting and increased tool life. Nelco Tool Co., Manchester, Conn. Booth No. 410.

T-3-1401

Gages

The Johnson system of screw-thread gaging and quality control includes fixed type ring and snap gages for conventional inspection and 'attribute' type



quality control. The ring-snap and roll-snap comparators embody the fundamental principles of Johnson gage design for determining screw-thread accuracy. Also included in the company's products are the setting and wear-check plug gages for determining degree and type of wear in thread gages and comparators. Johnson Gage Co., Bloomfield, Conn. Booth No. 817. **T-3-1402**

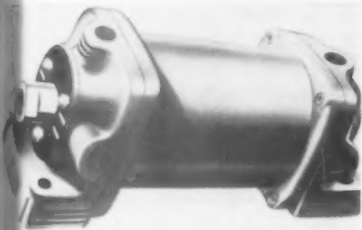
USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Universal Burr-Master

A new machine tool to be announced is the universal Burr-Master for complete high speed chamfering of hypoid pinion teeth developed by Modern Industrial Engineering Co., 14230 Birdwood Ave., Detroit 4, Mich. Among the features of the Burr-Master are said to be complete elimination for need of skill on the part of the operator, automatic clamping and locating, chamfering of the sharp profiles at both ends of the teeth plus part of the roots and inside corners on the peripheral chamfer, an output of up to 300 pinions per hour per head, and ability to handle pinions of different tooth numbers and diameters with only minor setup changes. **T-3-1411**

Hydraulic Cylinders

A hydraulic cylinder, the covers of which may be rotated for any pipe connection and installation made in a minimum of space, is now being offered by Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass.



External "O" rings, instead of ordinary gaskets, are used as static seals, to provide for leak-proof operation. Sealing efficiency of the ring improves with increased pressure. Booth No. 1027.

T-3-1412

Tapping Attachment

The S.P.V. tapping attachment made by the Eric S. Johnson Co., 230 East Ohio St., Chicago 11, is a newly de-



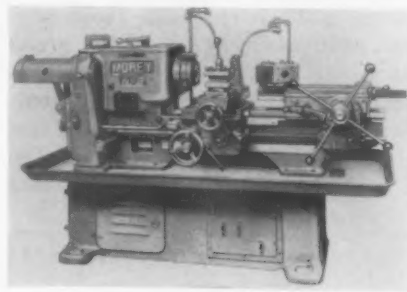
signed accessory which can be used in all drilling machines, lathes, etc., which have reversible spindles. Since it is not necessary to move the tapping attachment axially during the tapping operation, the weight and pressure factors which must be considered in the use of conventional tapping attachments are eliminated.

Some of the advantages claimed for the S.P.V. tapping attachment are improved threads, lower production costs, greater tap life and a low price. Booth No. 111.

T-3-1413

Turret Lathes

The Morey No. 3 turret lathe is designed to take full advantage of tung-



sten carbide tools. High as well as low spindle speeds are provided. Machines are ruggedly built and are heavy to attain the maximum feeds and speeds the work and tool will permit. The design incorporates new methods of speed and feed control which permit even the unexperienced operator to select the speed and feed best suited to the work with the minimum of manual effort. Morey Machinery Co., 410 Broome St., N. Y. 13. Booth No. 1250. **T-3-1414**

2 NEW "MITI-MITE" TOOLS

Be Sure to See
Them at the
A. S. T. E.
SHOW

AN INVALUABLE MAGNETIC BASE LIGHTING UNIT THAT HOLDS 100 WATT BULB TO CURVED OR FLAT SURFACES INSTANTLY!

MITI-MITE NO. 250

PRICE \$18⁵⁰ Complete

NEW, PORTABLE "MITI-MITE" DE-MAGNETIZER—
The Foolproof Device Industry Has Been Waiting for

MITI-MITE NO. 500

OTHER "MITI-MITE" UNITS		
No. 100	Magnetic base holder for smaller test indicators	\$7.50
No. 120	Combination Test Indicator magnetic base holder and double lens 4X magnifier	12.00
No. 150	Duplex Magnetic Base Holder for all dial indicators up to 2" dia.	\$15.50
No. 200	Magnetic Base Hand-Lite complete with 25 and 40 watt bulbs	\$8.50

PRICE \$10⁵⁰ Complete

ENCO MANUFACTURING COMPANY, Dept. 432
4524 W. Fullerton Ave., CHICAGO 39, ILL.

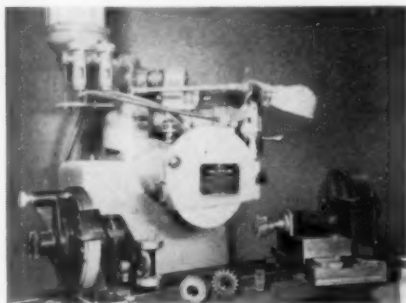
Order from your mill supply dealer or send order with name of your mill supply dealer

SEND FOR BULLETIN 604

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-141

Grinding Gears

For the first time gears have been generated completely on a DoAll surface grinder with a gear generating at-



tachment. This unit produces all types of gears up to 6 in. in diameter with any pressure angle desired and with any number of teeth up to 100. Only one simple setup is required. These gears can be ground from the solid or precut as desired without using base cylinders, masters, racks, grinders, etc. The only accessories needed are a sine bar and gage blocks. The DoAll Co., Des Plaines, Ill. Booth No. 1634. T-3-1421

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Simplify LARGE HOLE Tapping

with the New Procnier TAP KING

This lightweight, heavy duty tapping attachment was designed especially for difficult large hole tapping. Rugged, dependable, with a super-tap capacity of $\frac{3}{8}$ " to 1" in steel and up to 1 $\frac{1}{2}$ " in softer materials, the Tap King has been establishing production records. Many users report 50% production increases on large hole tap jobs and costly parts spoilage practically eliminated! And these are not isolated cases! Other users claim more spectacular daily production gains. Production men report amazing savings in parts spoilage and consistent, more accurate maintenance of uniform tap depth—even on large blind hole tapping jobs! Check these unique features:

Exclusive 17 tooth spline drive from clutch to tap holder spindle, gives smooth, powerful drive, increases tapping accuracy and reduces strain, wear and vibration; new, sensitive yet powerful friction clutch drives tap smoothly, with finger tip control—drastically reducing operator fatigue resulting in more work in less time with less effort; ball and needle bearings assure longer, trouble-free life; reverse speed is twice forward speed; simplified oiling system; aluminum housing; PLUS many other unusual features. **Write TODAY for circular.**

Be Sure To Visit Our Booth No. 1624
At The A.S.T.E. INDUSTRIAL EXPOSITION
March 17th to 21st



**NEW! LARGER!
"TRU-GRIP" Tap Holder**
Makes tapping easier close to walls or shoulders, eliminates "chewed" tap shanks. Lighter, smaller in diameter, it drives the tap by the square, holds it true by the round.

Procnier
Safety Chuck Company

16 S. CLINTON ST. CHICAGO 6, ILL.

PROCNIER SAFETY CHUCK CO.
14-16 S. Clinton St., Chicago 6, Ill. Dept. 3

Gentlemen: Please send me full details on the new Procnier "TAP KING" Heavy Duty Tapping Attachment.

Name.....

Address.....

City.....Zone.....State.....

Electronic Pilot Relay

An electronic pilot relay, capable of controlling large values of current and power with a current flow of 2 millionths of an ampere through the utilization of an unusual cold cathode tube of unlimited life, has been announced by Haledy Electronics Company. The minute flow of current now permits delicate mechanisms with extremely light contact pressures to control large electrical currents.

The Haledy relay's cold cathode tube (TT-1) is designed for use under the most rugged conditions since it has no heater filament and it is assured unlimited life. In effect this results in a minute amount of current required to operate; and an instantaneous starting operation (no warm-up). The relay will operate over any impedance from a dead short to 10 megohms, with leads of unlimited length. It also boasts a current amplification up to 2 $\frac{1}{2}$ million.

Utilizing a 115-volt, 60-cycle line source the Haledy relay consumes two watts when in operation. The pilot relay is housed in an 18-gage steel case of wrinkle gray finish; and a visible jewel indicator permits visibility to off/on operation even while relay case is locked.

T-3-1422

Capstan Lathe

The model ER15E precision capstan lathe made by Boley and Leinen, Eschgen, Germany, is distributed exclusively in the U. S. by Guthery Machine Tool Corp., 150 W. 42nd St., N. Y. 18. The model has a sturdy sheet steel base and



is suitable for operation either in standing or sitting position. The lathe carries the horizontally tilted turret, which is rigidly locked in each of its six working positions, for each of which a longitudinal stop can be accurately set. Booth Nos. 1827-1831. T-3-1423

The Tool Engineer

Power Press

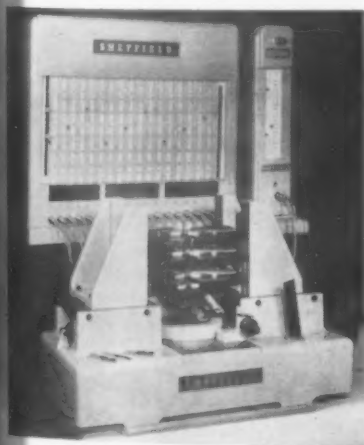


The No. 30T V & O high-speed power precision press with air clutch features the V & O long slide for accurate guiding for longer die life. Many production advantages and economies are assured with the use of V & O power presses and feeds in the blanking, drawing, forming and perforating of all types of parts. The V & O Press Co., Div. of Emhart Mfg. Co., Hudson, N. Y. Booth No. 1331. **T-3-1431**

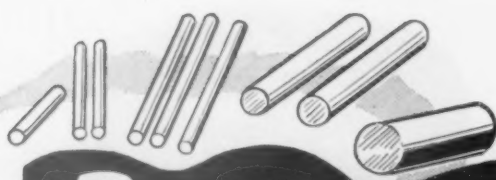
Measuring Instrument

Eighteen points on a jet turbine blade, three points on each side at the top, middle and bottom, are checked simultaneously by this Sheffield Precisionaire 18-column measuring instrument.

The various patterns of the float positions on the "Airechart" indicate not only the dimensional quality of the contour but also the lean and twist, if any, of the blade on its root.



A unique universal movement of the blade mounting fixture permits the blade to be thoroughly examined in all planes so that the deviations from the perfect blade may be measured most precisely. The Sheffield Corp., Dayton, Ohio. Booth No. 710. **T-3-1432**



Precision Rod Cutting at High Speed

with the New DI-ACRO ROD PARTER

The DI-ACRO Rod Parters further increase the applications of "DIE-LESS DUPLICATING" as a cost-cutting, time-saving production technique:

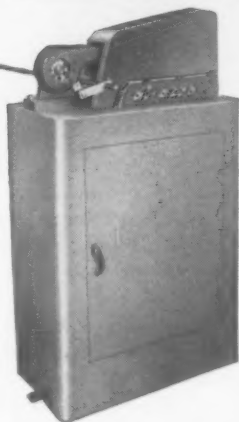
Do you require precision?—The DI-ACRO Rod Parters hold tolerance to .001" on duplicated cuts. The ends are square, and roundness is maintained.

Do you want speed?—The Rod Parters exceed output of other methods with equal accuracy, on rods and bars up to 5/8". Torrington Roller Bearings incorporated in an exclusive multiple leverage arrangement provide remarkable ease of operation in both heavy and light materials. DI-ACRO Power Parter has air cylinder cushioned for quiet and efficient operation. Each cutting cycle obtained with 4-way foot valve—leaving operator's hands free.

See Di-Acro Exhibit Booth 1338
ASTE Industrial Exposition
Chicago, March 17-21.



375 8th Ave.
Lake City, Minn.



DI-ACRO POWER PARTER



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-143-1

NEW—AMAZINGLY FAST AND ACCURATE

"CURTA" PORTABLE CALCULATOR

Does MORE than Calculators Costing \$400.00
A Necessity for Engineers, C.P.A.'s, Estimators, Contractors—Everyone Who Works with Figures.



IMPORTED—Made by Swiss Watchmakers

- Carries to Five Decimal Places
- Totals to 99 Billion
- Adds • Subtracts • Multiplies
- Divides • Square Roots • Cubes
- Factors • Percentages

The Curta Calculator is so fast it pays for itself over and over again in time saved. It combines the portability of a slide rule with the speed and accuracy of large desk calculator.

A fine precision instrument, sturdily built of anodized steel to give years of service. Weighs only 8 ounces. Absolutely accurate. Figures can be checked and rechecked on 3 sets of dials—guaranteed for one year.

A LIMITED NUMBER AVAILABLE FOR IMMEDIATE DELIVERY

ORDER NOW Check, Money Order or C. O. D. **MONEY BACK** If not Satisfied After 10 day trial

WITH RUBBER LINED METAL CASE..... **\$129.00** Plus \$5.70 Fed. Tax

WRITE FOR FURTHER INFORMATION

Curta Calculator Co.

5541 S. Ashland Ave., Dept. T, Chicago, Ill.

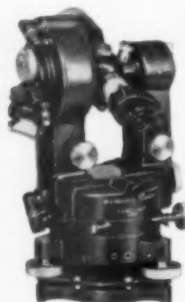
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-143-2

ACCURATE TIME-SAVING INSTRUMENTS for OPTICAL TOOLING

MICRO- ALIGNMENT TELESCOPE



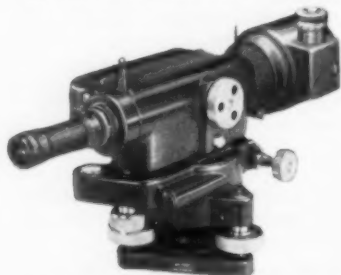
For point alignment, with built-in optical micrometers—.001" direct reading—and for precise square setting. Available with target plugs, collimating unit and auto-reflection accessories. Shown with prismatic stride level and sphere adaptor.



MICROPTIC THEODOLITES (Transits)

With vertical and horizontal circles of glass fully enclosed and illuminated. Model 2—1 sec. Model 1—20 sec. Special aircraft industry models are available.

MICROPTIC LEVEL B131A



With built-in optical micrometer—direct reading to .001". Fully erect image.

See Our Exhibit Space 525
Quality Control Hall
ASTE Industrial Exposition
Or write for complete information

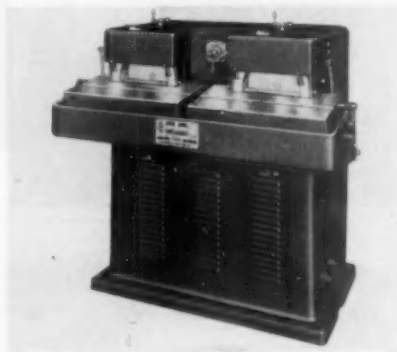
ENGIS EQUIPMENT CO.

431 S. Dearborn St., Chicago 5, Ill.

INDICATE A-3-144-1

Twin-Wheel Grinder

A standard twin-wheel tool grinder for carbide Stellite or high-speed tools is made by the Standard Electrical Tool Co., 2499 River Road, Cincinnati 4, Ohio. The grinder is designed for operator comfort, visibility and conven-



ience. A copious supply of coolant on the wheel and the cutting tool assures precision results without spray or splash. Since the grinder can be placed against a wall, savings in floor space are also possible.

Each table has renewable reversible wear plates. A quick-acting thumb screw releases the structural plate steel hinged wheel guard for access to wheel mounting screws. A new wheel can be mounted in less than five minutes, while wheel wear is compensated for by adjusting the wheel toward the table for minimum clearance. Booth No. 1727.

T-3-26

Small Magnetic Chucks

Two small-sized magnetic chucks that concentrate deep magnetic holding power in a small, compact area are now available to speed precision grinding of small workpieces.



Built by Viking Industries of Rockford, Illinois, the units have small, rectangular steel surface plates precision ground parallel with the mounting base. Both units operate equally well in either a horizontal, angular, or vertical plane. Operation is from 6-volt direct current rectified from standard ac. Booth No. 1208.

T-3-34



UNCLE SAM is saying: "Take Good Care of DIAMOND TOOLS"

Helping conserve Diamonds has been a Koebel policy for years. What has been an economic advantage to Koebelite users now becomes a government requirement. We offer you:

1. A booklet to give education and experience to your operators in the USE, NOT ABUSE of diamond tools.

2. Shop posters for your tool cribs. No charge, no obligation. We will be glad to do our part. Write (on your letterhead, please) for sample booklet and poster.



KOEBEL DIAMOND TOOL COMPANY

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FIRST to give diamond users the advantage of diamonds set in powdered metal.

KOEBELITE

TRADE MARK
INDICATE A-3-144-2

The Tool Engineer

**WO NEW CARBIDE
OST-CENTERS FROM
ASTERN TOOL...**

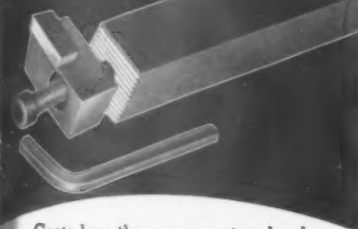


**CARBIDE
INDICATOR POINTS**
Outlast Tool Steel
200-400 Times By Test!

That's a fact—from laboratory and field! Hard carbide tip withstands sudden gaging shock— withstands wear of rapidly turning cylindrical pieces. These Etco carbide indicator points on every dial and gage in your plant will deliver a long life of consistently accurate readings—substantially reduce rejects—and save dollars in initial and replacement costs. Available in standard sizes—to your prints—on your old bodies—or as new units.

AND...

**ADJUSTABLE HEAD TOOL
WITH SOLID CARBIDE TIP**



Costs less than many standard tools and saves you time and dollars all along the line. Head adjusts to work on center in matter of seconds; rough grinding practically eliminated; resharpening simplified; tip-fracture practically eliminated by Etco's special process of sandwich brazing.

E Write Today For Illustrated Literature on These And Other Superb Eastern Tools. Your Inquiries On Indicator Points—Standard Or Special—Will Meet With Prompt, Interested Attention.

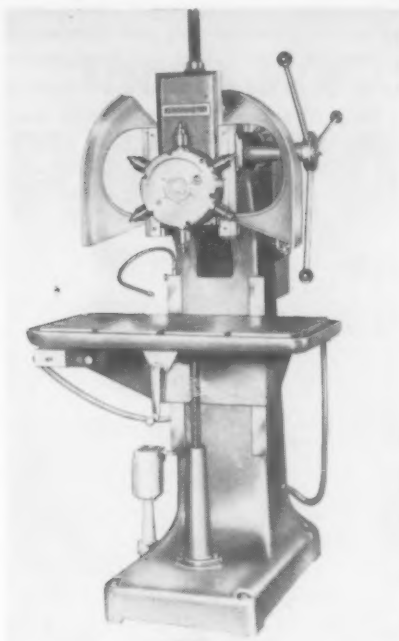
**Eastern
TOOL COMPANY**
EAST HARTFORD • CONN.

INDICATE A-3-145-1

March, 1952

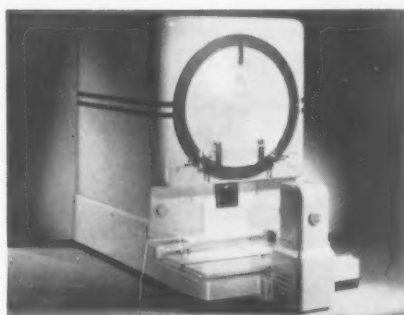
Drill Press

The #2 Model A drill press has been developed to combine the time-saving features of the turret lathe and the simplicity of the drill press. It is a six-spindle, automatic, indexing, drilling and tapping machine.



Some of the features of the drill press are: power index from one spindle to another with a wide range of speeds; $\frac{3}{4}$ -in. capacity in steel; heavy duty tapping head; 8-in. stroke; extra heavy one-piece column. Made by the Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34. Booth No. 1113. T-3-1451

Optical Gaging Device



An inexpensive projector designed to introduce optical gaging methods into production assembly and inspection has been announced by the Eastman Kodak Company. By projecting a greatly enlarged shadow or a surface reflection of any object placed in its staging field onto a large and well illuminated screen the machine permits instant visual checking of the actual part against detailed drawings or other specification data previously placed over the viewing screen. Booth No. 518. T-3-1452

**FOR FINEST FINISH
LUFKIN
CHOOSES
HYPREZ**

Precision Micrometers made by The Lufkin Rule Co., Saginaw, Mich. . . . Spindle faces shown before and after Hyprez finishing.



HYPREZ

DIAMOND COMPOUNDS

**Save Man Hours —
Improve Quality**

Type "OS", for manual or production lapping, is self-lubricating, absorbs more abraded material—has long-lasting cutting action.

Like Type "W", it is compounded with precision-graded diamond particles—uniformly distributed, permanently suspended.

All Hyprez Diamond Compounds are available in 18 and 5 gram color-identified cartridges for use with the Hyprez Applicator Gun. Also in jars or foil tubes.

**SEE THE HYPREZ EXHIBIT
SPACE 525 Quality Control Hall
ASTE Industrial Exposition
CHICAGO, MARCH 17-21**

or write Dept. T-352

**HYPREZ DIVISION
ENGIS
EQUIPMENT CO.**

431 S. Dearborn St., Chicago 5, Ill.

INDICATE A-3-145-2

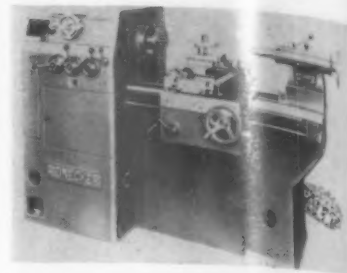
Relieving Lathe

Two new Reinecker machines, a completely redesigned relieving lathe incorporating a new principle in back-up turning, which triples the operating speed of previous models, and a rotary face grinder for thin workpieces, are available from the Kurt Orban Co., Inc., American distributor.

Complete independence of the three groups of change gears in the Reinecker lathe transmission, greatly simplifies operation of the machine. Combined in the headstock are the spindle

speed gears, the change gears controlling the thread pitch, the number of chip flutes and the lead of the chip flutes. All controls are also conveniently grouped at the headstock. With all movements of the tool compound independent of each other, complicated tables for machine settings are eliminated.

Contact between cam and compound is effected by a closed, large diameter curve. Forward and backward motion of the tool compound is positively controlled and without end play, permit-



ting a greater number of strokes—up to 270 per minute—compared with 40 to 100 per minute in previous models. Stroke length can be varied from 0 to 5/8" without changing plate cams, whereas former lathes required cams to be changed for each different height or flute-depth.

Among the attachments which extend the utility of this new Reinecker lathe are: a relief-grinding unit, tiltable in three planes and containing a built-in drive motor for the spindle; a newly developed grinding wheel dresser which dresses the wheel without removing the spindles from the machine. T-3-1461

Cutting Fluids

Magnus Chemical Company, Inc., Garwood, N. J., announces the addition of specialty cutting fluids to their line of industrial cleaning materials and machines.

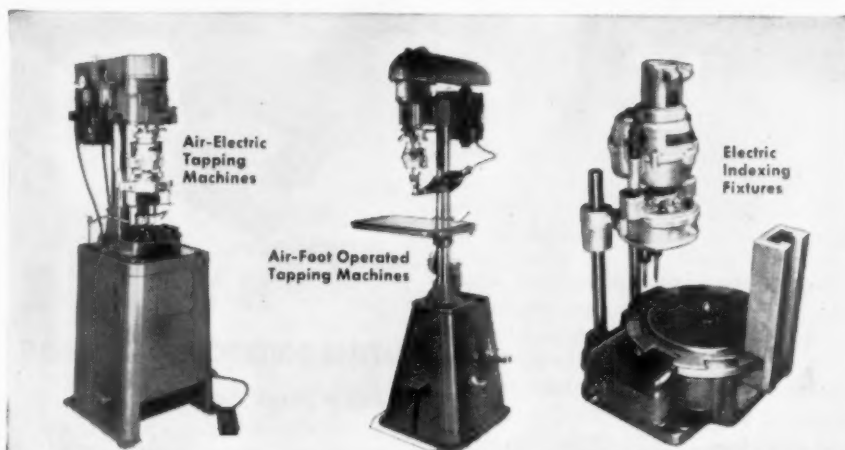
These fluids are designed for tough machining operations, such as work on stainless steel, high carbon steels and other difficult machining metals where general purpose cutting fluids cause excessive tool wear and poor surface finishes.

Compound No. 7 undiluted is recommended for unusually difficult machining operations. For moderately difficult jobs, one part No. 7 may be added to two-five parts of general purpose fluid to step up their efficiency. Where staining of copper is to be avoided, Compound No. 6 is recommended.

For difficult machining jobs where greater cooling qualities are required, soluble oils DO-4A and DO-1A are recommended. These, with their high concentration of sulphur base, are also formulated to give good rust protection and minimize the occurrence of rancidity and dermatitis. They do not gum up in service. T-3-1462

Hardness Testers

The Service diamond hardness tester is built with the precision of a laboratory instrument, rugged enough for production use, by the Service Diamond Tool Co., 2505 Durdette Ave., Ferndale, Mich. The company also manufactures penetrators and standard test blocks. Other machines are available for testing loads from one gram to 150,000 grams. Booth No. 719. T-3-1463



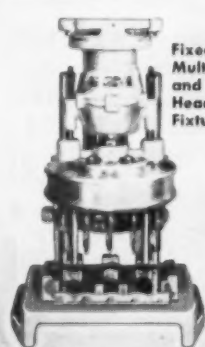
NOW! A TOOL THAT TAPS 100 HOLES A MINUTE

This revolutionary new tapping attachment will be demonstrated for the first time at the ASTE Show in Chicago.

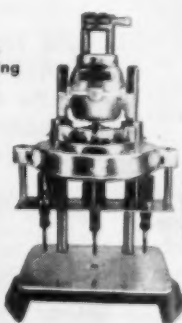
See it in action along with these other high production Ettco-Emrick tapping and drilling tools.

BOOTH No. 1243

ETTCO TOOL CO., INC. 594 Johnson Ave., Brooklyn 37, N. Y.



Fixed Spindle Multiple Drilling and Tapping Heads and Fixtures



Adjustable Spindle Multiple Drilling and Tapping Heads and Fixtures

Keyless Drill Chucks



Tapping Attachments

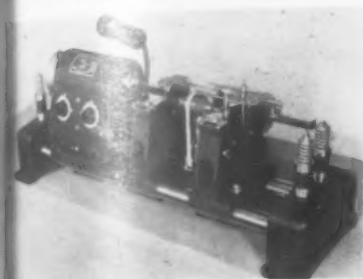


Tap Chucks

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-146

Balancing Machine

The Dynograph balancing machine is a precision electronic instrument which gives the operator, in a single reading, both amount and location of unbalance on rotating parts at speeds from 500 to



50,000 rpm. It has extremely high sensitivity, being capable of detecting an unbalance as small as one part in 100,000.

The Model S Dynograph is designed so that one basic machine structure can accommodate a wide variety of work by the simple expedient of changing the bearing head supporting structures. R. B. Annis Co., 1101 N. Delaware St., Indianapolis 2, Ind. Booth No. 614.

T-3-1471

Reamer-Tapper

A new machine which performs the difficult operation of reaming and tapping exceedingly small holes simultaneously has recently been announced by the Govro-Nelson Co., 1933 Antoinette, Detroit 8.

Small brass discs are first run through a Govro-Nelson drilling machine, two holes being drilled, and a third hole drilled and counterbored with a combination tool for the tap.



The part is then run through the machine which incorporates two Govro-Nelson automatic drilling units to ream the previously drilled holes; also one Govro-Nelson tapping unit to tap the #00-96 hole, all done simultaneously.

By varying the position of the units and the tools employed, the machine can readily be adapted to other reaming and tapping operations. Booth No. 619.

T-3-1472

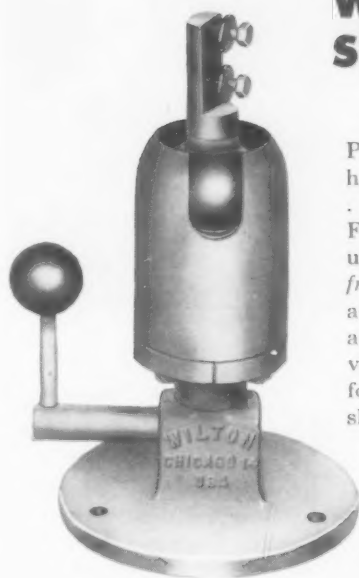
LOOK! THREE HANDS!

That's Why POWRARM

WORK POSITIONERS SPEED PRODUCTION, CUT COSTS

POWRARM gives the worker a powerful third hand . . . holds work rigid in any desired position . . . leaves two hands free to produce faster. For one vital defense manufacturer POWRARM units have cut production time on one subassembly from twelve days to three. With POWRARM aid another manufacturer now produces intricate assemblies three times faster, at half the previous cost. He uses POWRARMs mounted on platforms which travel between stations on roller skates.

New, profitable applications for POWRARM are busting bottlenecks daily on the nation's most efficient assembly lines. A Wilton representative can quickly show you how POWRARM on your assembly lines can speed output, cut the cost of assembly, reduce worker fatigue, and boost employee morale.



Holds Work at any angle in
Horizontal, Vertical or Co-axial Plane.

On Production Lines POWRARM Speeds and Simplifies Every Operation



Write for 32 page Catalog
... full facts on POWRARM
and Wilton Vises, Too.

WILTON TOOL MFG. CO.

925 WRIGHTWOOD AVENUE

CHICAGO 14, ILLINOIS

Your inspection invited at Booth 237, ASTE Show, March 17-20
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-147

MEASURE IN MICROINCHES RMS

By 3 to 2

it's a shop tool!



The Profilometer at *National*



At the National Cash Register Company plant in Dayton, Ohio, Profilometers used as shop tools outnumber those in inspection three to two.

For example, the Profilometer shown is on *actual* production work in a machining department. Here, the surface finish of a bearing in a side frame of a cash register is being checked. Reaming specifications call for the bearing surface to have a rating of 20 microinches or less.

Other Profilometers are used as shop tools in two parts-machining departments. Still others are used in tool inspection and in investigation-inspection. The latter section—with the help of the Profilometer—determines if the engineering specifications for surface finish are being met.

Extreme accuracy has always been stressed in the more than 180,000 different parts that go to make up National Cash Register accounting machines and adding machines. Because of that policy, the National Cash Register Company was one of the original purchasers of a Profilometer. That investment has paid off many times.

If accuracy in surface roughness measurement is important in your plant, the Profilometer can give it to you.

To learn how the Profilometer can help cut costs in your production, write today for these free bulletins.



Profilometer is a registered trade name.

**MICROMETRICAL
MANUFACTURING COMPANY**
formerly PHYSICISTS RESEARCH COMPANY
Instrument Manufacturers

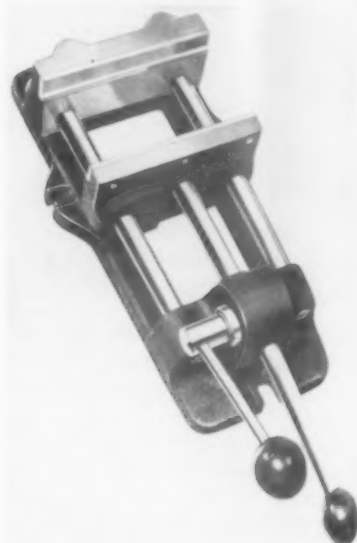
ANN ARBOR 10

MICHIGAN

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-148

Screwless Vise

The Grip-master screwless vise is rapidly loaded and unloaded. Work is leveled by built-in parallels and locked in place simply by lowering the locking



lever. Extra wide clearance between jaw guides permits clear-through drilling and prevents interference from chips and burrs. Removable V-jaws make it possible to hold round and oval stock. Made by National Machine Tool Co., Racine, Wis. Booth No. 232.

T-3-1481

Flexible Shaft Machines

Flexible shaft grinding, sanding, wire brushing and polishing machines and accessories are made by R. C.



Haskins, Co., 2651 W. Harrison St. Chicago 12. The H-6 flexible shaft equipment is furnished with a $\frac{1}{2}$ -hp motor and Timken bearing counter-shaft to give four speeds from 825 to 3400 rpm, six feet of heavy duty flexible shaft core and casing and ball bearing spindle. Booth No. 333. **T-3-1482**

PIONEER TOOL & ENGINEERING CO.

Cordially Invites

You to Visit Us At

BOOTH NO. 547

PRECISION CONTROL HALL
ASTE Industrial Exposition
International Amphitheater
Chicago, Ill., Mar. 17-21

• ENGINEERING & MANUFACTURING

Tools, Dies, Jigs, Fixtures

• PRECISION INSTRUMENTATION

Checking Equipment

• PRECISION INSTRUMENTATION

Casting Manufacturing

• GAUGE BLOCK JACKS



Pioneer Tool & Engineering Co.

3914-18 W. SHAKESPEARE

CHICAGO 47, ILL.

INDICATE A-3-149-1

March, 1952

Pushbuttons

Key-operated cylinder-locks for oil-tight pushbuttons are available from Westinghouse Electric Corp.

These cylinder locks come in two basic types: the selector switch, which has either 2 or 3 rotary positions; or the pushbutton type, which can be depressed in either full or intermediate positions. Several models cover virtually all possible conditions. For example, the pushbutton type allows the key to be removed in the depressed position, in the undepressed position, or in both; and, similarly, the selector-switch type allows the key to be removed in any one or all of the various positions.

These cylinder locks are mounted in place of the standard operator on Class 15-022 Oil-Tite pushbuttons for panel mounting, or in surface-mounting or flush-mounting stations. All operators of the complete Oil-Tite line are mounted in identical round holes in panels varying in thickness from $\frac{1}{16}$ to $\frac{1}{4}$ inch without requiring an extra gasket.

The single- or double-pole contact blocks can be mounted either in the bottom of the box or on the operator.

T-3-1491

Safety Tongs

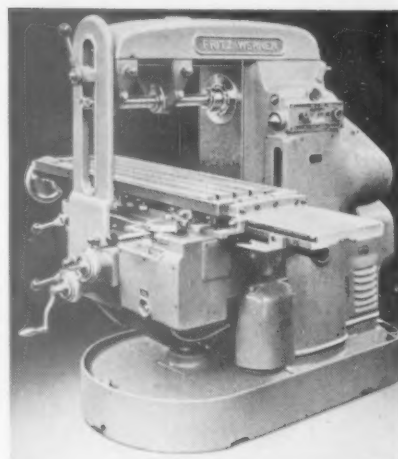
Magline, Inc., Pinconning, Mich., manufacturers of magnesium materials handling equipment, announce the addition of a new model to their line of lightweight safety tongs. The new design incorporates fully adjustable handles to provide greater ease and flexibility for press and shear feeding operations.



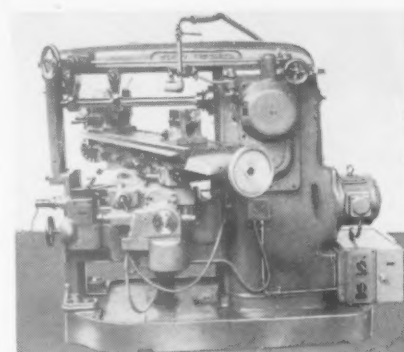
Simply operated, the new tongs adjust instantly to any desired position. Tension at the points of adjustment is automatically maintained. Durable constructed of specially alloyed magnesium, the tongs are designed to crush, if accidentally caught within the die opening, thus preventing damage to the die. The company states that the new safety tongs possess magnesium's rigidity, lightness and durability.

T-3-1492

now available



for early delivery

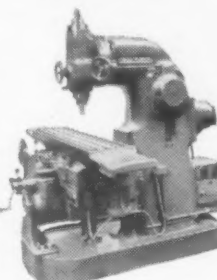


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Manufactured by one of the largest machine tool manufacturers in Europe, these millers offer every feature you could desire for economical, perfect precision operation—plus REASONABLE delivery. In sizes 1, 2, 3, 4 and 5, universal, vertical and plain—also manufacturing types. Write today for complete illustrated brochure No. 7.



MARAC machinery corporation

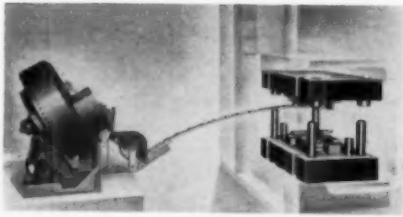
1819 BROADWAY

NEW YORK 23, N. Y.

Circle 7-2048

INDICATE A-3-149-2

Inserts Clinch Nuts



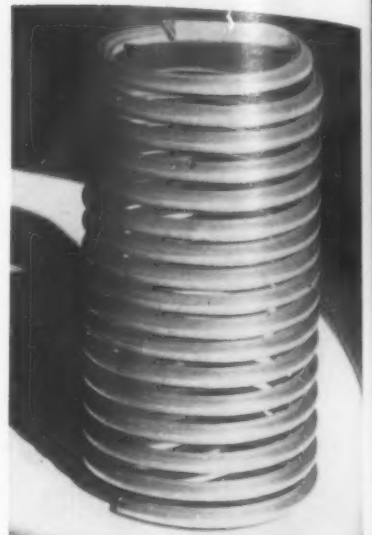
New tooling to insert type H clinch nuts simultaneously with other production steps has been announced. This

tooling consists of an interchangeable magnetic punch and clinching die button. It becomes a normal piercing station in the die which makes the part.

The interchangeable punch and die eliminate extra clinching for clinch nuts and makes them substitutes for welded nuts or tapped holes.

Clinch nuts are fed to the piercing station from a hopper and flexible feed chute adjacent to the press. One stroke of the press pierces and clinches a nut. Richard Brothers Division, Allied Products Corp., 1560 E. Milwaukee, Detroit 11. Booth No. 225. **T-3-1501**

Thread Inserts



The Heli-Coil Corp., Danbury, Conn., announces the availability of helical-wire thread inserts for use in the automotive, aviation, electrical equipment, construction equipment, metalworking, woodworking and other manufacturing industries.

Helical inserts in iron, steel, aluminum, magnesium, wood and plastics provide threads that have higher loading strengths and greater resistance to wear than unprotected threads in these same materials. Booth No. 316.

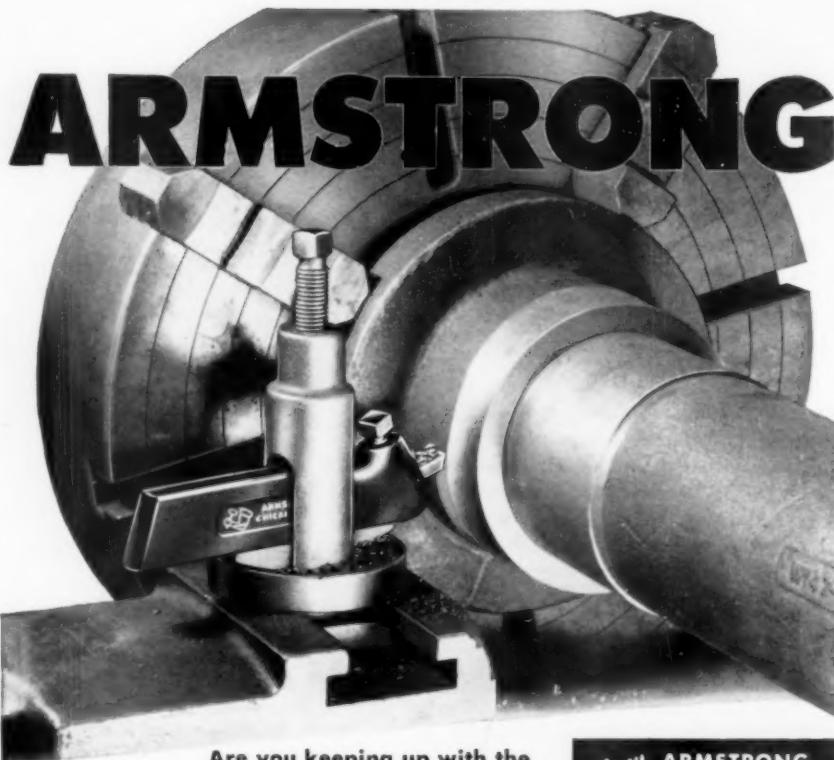
T-3-1502

Thread Comparator

The Hanson-Whitney Co., Hartford, Conn., is now offering a new precision instrument expressly designed for inspection and production gaging of external threads. It has been tested since 1945 in checking all forms of threads, including critical aircraft threads.



The indicator tells at a glance whether the product is oversize, undersize, eccentric, tapered, or if lead error exists. The work is recorded visually to accepted ring gage tolerances, thus eliminating the human error possibility of "feel." Booth No. 829. **T-3-1503**



Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

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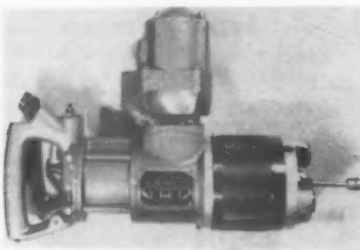
Lubrication Systems



Bijur Lubricating Corp., Rochelle Park, N. J., announces a new method of lubricating a vertical "V" slide. This is accomplished by metered control of the oil flow and the proper grooving of the bearing surfaces. Oil is automatically delivered to the bearing, where an oil film is maintained. Booth No. 641. **T-3-1511**

Airmatic Countersink

The Cleco airmatic countersink is a basically new air tool for metal fabricators. It will countersink a $\frac{3}{8}$ -in. hole in 75-ST aluminum in 9 seconds and will give comparable service in 27-ST aluminum as well as alloy steels.



There are only two controls, one for clamping the tool to the work and one for rotation. A built-in micrometer gives accurate adjustment of the standard bayonet-type countersink. Cleco Div. of Reed Roller Bit Co., P. O. Box 2119, Houston 1, Texas. Booth No. 413.

T-3-1512

Precision Punches



Porter Precision Products, Cincinnati 31, Ohio, are the makers of 3-P precision piercing punches, button dies and punch retainers. These piercing punches are carried in stock for immediate delivery and are available in thousands of different sizes for practically any general purpose and special punching applications. The tools are available in three kinds of high alloy tool steel. Booth No. 1830. **T-3-1513**

March, 1952



One of the most exacting machining operations in the production of turbo-jet engines is the grinding of compressor rotors in the Kansas City plant of the Aviation Gas Turbine Division of Westinghouse Electric Corporation. Two 24" x 96" Norton cylindrical grinders are mounted, as shown above, directly on Korfund Steel Spring Vibro-Isolators without the usual massive foundations. These grinders are 19' 6" long and weigh 27,200 $\frac{1}{2}$ each.

...by protecting grinder accuracy against external vibration

Extremely close tolerances required for compressor rotors made it necessary for Westinghouse to isolate their cylindrical grinders from heavy external truck vibration.

Conventional foundations would have required an excavation through the existing floor 7 ft. wide by 22 ft. long by 4 $\frac{1}{2}$ ft. deep—with over 20 cubic yards of concrete weighing approximately 80,000 lbs.—for each grinder.

In contrast to this, Korfund Steel Spring Isolators permitted installation of the grinders directly on the existing concrete floor after simply removing the wood block to help reduce the height of the installation.

Tests made after the installation was completed—in which the isolators were "short circuited" out—demonstrated that it would have been impossible to do accurate work on the grinder without Korfund Vibration Control. Rigid alignment of work and grinding head is maintained, as proven by the fact that during the first two years of operation, no adjustments have been required.

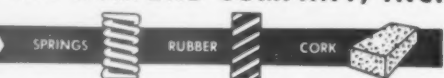
Korfund Isolators more than paid for themselves in reduced foundation costs alone.

If you would like more information on how Korfund Vibration Control can save you money and increase production, write for your free copy of "Steel-Spring-Type Vibration Mountings for Machine Tools." Also, a selector chart in Bulletin G-104 gives recommendations for both normal and critical installations—for machine tools, presses, hammers, pumps, compressors and most other types of mechanical equipment. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you'll find in most principal cities. A half century of experience is at your disposal.



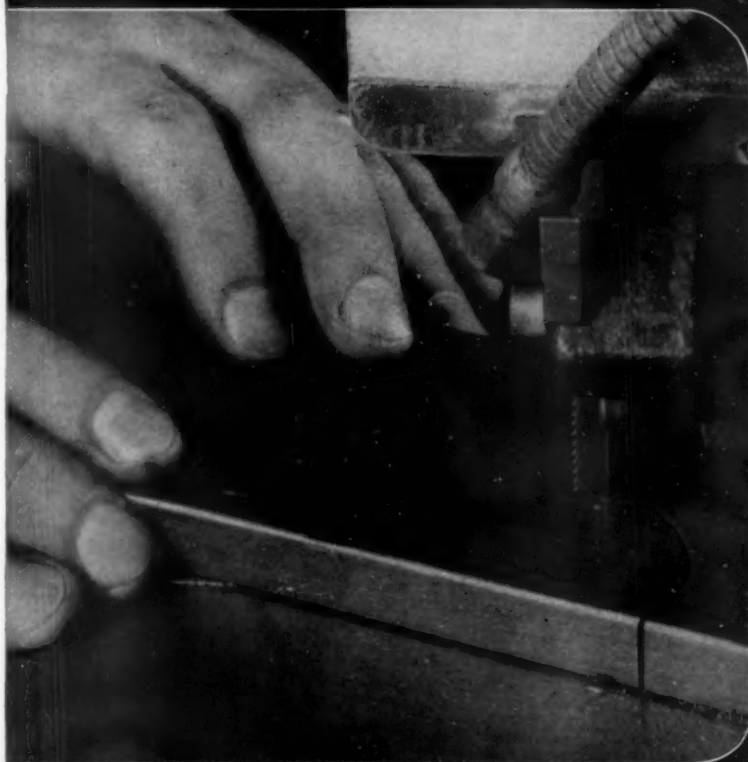
THE KORFUND COMPANY, INC.



48-40J Thirty Second Place • Long Island City 1, N. Y.
In Canada: 2040 Victoria St., Montreal 2

See us at the Tool Engineers Industrial Exposition, Chicago, March 17-21, Booth No. 1011
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-151

Your PROBLEM
IS Our JOB



Working with a wide variety of band and power hack saw machines, Milford Specialists continually test MILFORD Blades under both normal and severe break-down conditions. The carefully tabulated results contribute substantially to the development of MILFORD Blades that give you maximum performance in the type of metal you cut. MILFORD Specialists make your metal cutting problems theirs. If necessary, special tests are conducted on your material to make sure you get maximum production at the lowest cost.

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THE HENRY G. THOMPSON & SON CO.

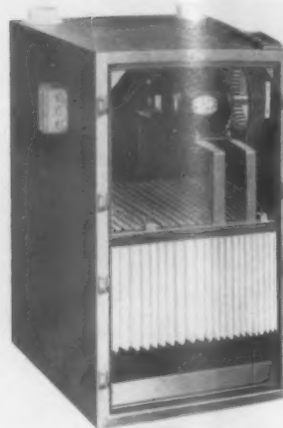


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FOR OVER 75 YEARS
NEW HAVEN 5, CONNECTICUT

PROFILE AND BAND SAW BLADES,
HAND AND POWER HACK SAW BLADES

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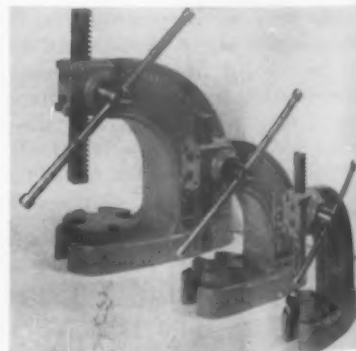
Dust Collector



These self-contained units carry away dust-laden air around polishing and grinding wheels. They are portable. Dust-laden air is drawn from hoods surrounding the wheels, down through a compartment behind a motor in the cabinets, then up through a series of chemically treated, spark-resistant cloth filters. Heavy particles fall into a tray beneath the filters, while light particles adhere to the outside of the filters. Full particulars may be obtained from Torit Mfg. Co., St. Paul, Minnesota. Booth No. 242. T-3-1521

Arbor Presses

Benchmaster announces a line of specially developed arbor presses, offering the user increased work capacity, both in throat depth and in vertical space. At present they are furnished in three sizes, Numbers 0, 1 and 2 and in standard and solid platen types with choice of lever or pilot wheel actuation.



A streamlined appearance is the result of an effort to make every pound of metal function to advantage, to equalize stresses uniformly over the entire casting and in doing so, to avoid any area of weakness. Benchmaster Mfg. Co., 1835 W. Rosecrans Avenue, Gardena, Calif. Booth No. 1805. T-3-1522

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Here is the **DIE BOOK**
you've always wanted!



ANSWERS TO OVER 1,000 PRACTICAL DIE
PROBLEMS WITH USE OF DIRECT READING
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Gives you direct answers to die problems. Saves hundreds of hours of time. Eliminates laborious mathematical calculations. Avoids costly errors of Cut and Try Methods. Contains formulas and tables that the experienced die man encounters every day. Formulas in this book have been used for many years by leading die manufacturers and have proven accuracy. Quick reference—Instantly available.

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INDICATE A-3-153-1

Air Valve

A 1/4 in. MAC 4-way solenoid operated spring return air valve for actuating double acting cylinders is announced by Mechanical Air Controls, 15311 West 11 Mile Road, Royal Oak, Mich.

This valve has a full 1/4 in. pipe orifice area through the valve, and operation is by direct solenoid control and spring return of an aluminum spool which is the only moving part in the unit. Small special O rings mounted on this spool act as seals when they come in contact with the bores of the body and end cap retainers.



These bores are honed, polished, hard chrome plated, and repolished to a mirror finish to give an ideal contact surface and long life for the two O ring seals which are the only wearing parts.

Current requirements of the solenoid are only 0.8 amps inrush and 0.2 amps holding at 115 volts, 60 cycles. It is a constant duty type allowing the solenoid to be held energized for any period of time. The valve is available for any voltage or cycle requirement and can be mounted in any position. T-3-1531

Hardening Compound

Hard'n'Tuff is a new-type steel hardening compound that provides a nitriding, chromizing and a carburizing effect to metal surfaces. The part is heated, coated with a paste or powder, the coating fused, and the part quenched. Expensive heat-treating equipment is not needed.

The compound is effective on steel and cast-iron parts and is applied after the metal is raised to the proper temperature. A soft 1020 carbon steel can be raised to a hardness of about 60 Rockwell C or 600 Brinell, to improve the structural quality, hardness and wear resistance of the metal.

Application of the material is said to increase the service life of high-speed drills, cutting edges and wearing surfaces such as dies, molds, hammers, and cams. Doughty Laboratories, Inc., 500 Fifth Ave., New York 36. Booth No. 216. T-3-1532

Achieve
planned production.

Control

down-time on any
machine tool.

With Dilley Guards

that you can instantly GRIP (magnetically) to your machinery. Hosts of satisfied customers use them to effect:

1. Production

provide tru-vision of work and machinery.

2. Maintenance

keep chips out of costly mechanisms.

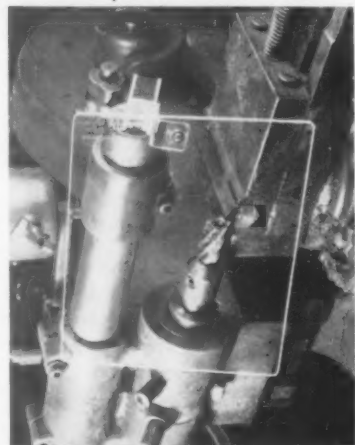
3. Housekeeping

keep chips in machine beds—out of aisles.

4. Safety

keep chips away from operating personnel.

as simple as shown . .



Pat. in Canada 1950

Magnetic Grip-Shields
are practical-versatile. Just GRIP them on.

U. S. Pat. No. 2,401,056

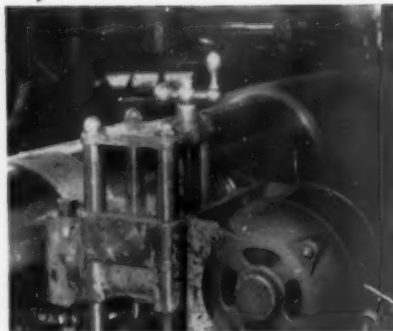
Write for literature

THE DILLEY MFG. CO.
1636 Ansel Rd. Cleveland 6, Ohio
INDICATE A-3-153-2

Machining Attachment

Versa-Mil is a motor-driven tool unit, providing a wide range of spindle speeds and adaptable for precision machining such as milling, boring and grinding. Its rigidity and efficient design enable it to remove metal comparable in rate to milling machines.

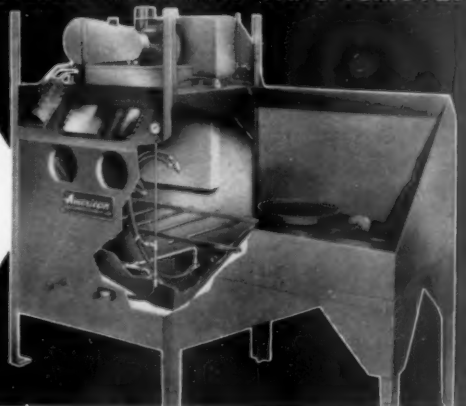
It is being used in a wide range of production applications. It is combined with machine tools to provide for special machining set-ups, or to combine two or more machining operations with only one set-up and handling. Made by



the Versa-Mil Co., 30 Church St., N. Y.
7. Booth No. 1942. T-3-1541

for simple and improved close tolerance scale removal

LIQUAMATTE wet blasting...



Fourteen advanced design features incorporated in the new Liquamatte make removal of scale and general cleaning, polishing and finishing of molds and dies easier and less costly. Its simplified design overcomes the many operating difficulties often found in wet blasting.

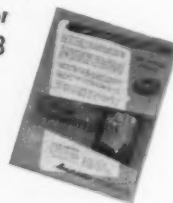
The Liquamatte has an exclusive vertical pump for slurry recirculation and agitation that overcomes packing leakage, shaft wear and plugging troubles. Ample clearance under the machine makes "good housekeeping" easy. Push button controlled—no valves to operate. The lightweight gun is easily maneuverable

and throws a steady stream of slurry from any angle.

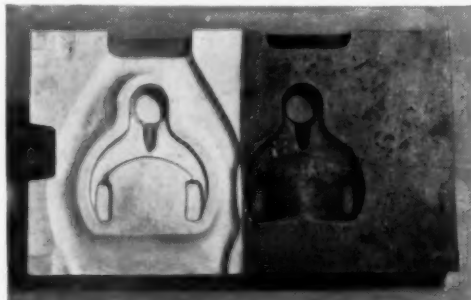
Applications in the tool and die industry are many and varied. Scale is completely removed from precision parts while holding tolerance as close as .0001". "Hand" finishes are produced mechanically in a matter of seconds. The Liquamatte will save you time and money.

GET THE FACTS.

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Bulletin No. 23



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ASTE Industrial Exposition
for a first-hand demonstration



Typical heat treated die, one half of which has been cleaned with the Liquamatte using a fine mesh Liqubrasive.

American LIQUAMATTE
WHEELABRATOR & EQUIPMENT CORP. WET BLASTING

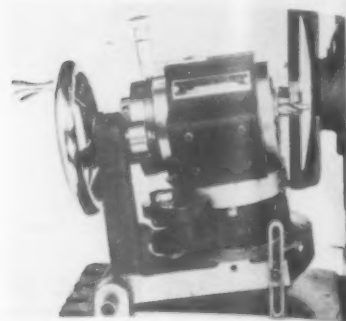
856 S. Byrkit St.

Mishawaka, Ind.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-154

Relief Grinder

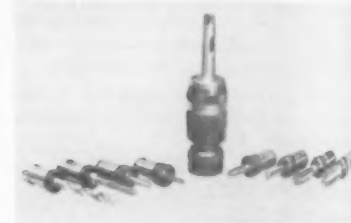
The D. S. radial relief grinder is made by Royal Oak Tool and Machine Co., 621 East Fourth St., Royal Oak, Mich. This machine produces a grind that permits cleaner, faster cutting while obtaining a greater number of cuts per grind and longer tool life.



The D. S. is a rugged unit, simple in design and so easy to set up and operate that any good grinder hand can produce radial relief (sometimes referred to as eccentric relief) as fast as ordinary angular grind. Booth No. 1101.

T-3-1542

Drill and Tap Chuck

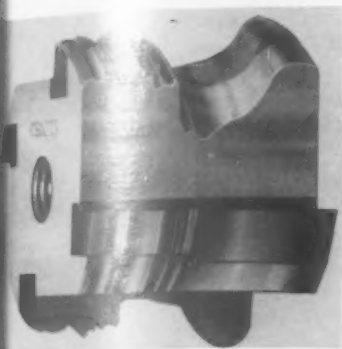


A basically new drill and tap driving chuck is presented by the Tri-State Machinery Co., 3041 W. Liberty Ave., Pittsburgh 16. A conventional chuck required torque adjustment in changing from one tap size to another or changing from drilling to tapping. The Asquith tapping chuck required no torque adjustment when changing from one tap size to another. The drivers holding the individual taps automatically provide the proper amount of torque to drive the tap and yet furnish the safety against accidental breakage of taps in bottoming operations. Booth No. 1912. T-3-1543

Steel Aids

Metallurgists and consultants from Joseph T. Ryerson and Son, Chicago, are prepared to aid steel users on problems of selection, application, fabrication and treatment of carbon, alloy and stainless steels. Information can be secured from the company concerning the treatment and use of intermetallic alloy steels, straight chromium stainless as an alternate for 18-8 chrome nickel stainless, welded tubing as alternate for seamless, machinability of bar steels and how to increase production. Booth No. 147. T-3-1544

Circular Form Tools



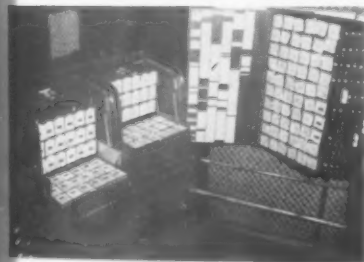
Carbide tipped circular form tools are one of the major products of the Arthur A. Crafts Company, Inc. of Boston, 603 Newbury St., Boston 15, Mass.

Outstanding for maximum productivity, these tools reduce the down time of screw machines to a fraction of that caused by the use of tools requiring frequent grinding.

Custom tailored to individual specifications, each tool has from two to four carbide cutting tips highly polished to a micro-finish for maximum life and accuracy. Booth No. 741. **T-3-1551**

Tool Crib Control

A complete unit of cabinets and boards provides a detailed record of each employee's tools or gages, preventing theft and loss; locates each tool whether loaned or in the crib; cuts crib inventories; reduces stock breakage;



facilitates the recovery of idle tools; eliminates delays, saving man and machine time; and stops arguments and otherwise speeds service. There is no increase in crib personnel. The McCaskey Register Co., Alliance, Ohio. Booth No. 505. **T-3-1552**

Imported Tools

Representing fifteen foreign manufacturers of machine tools and instruments, the Cosa Corp., 405 Lexington Ave., New York 17, is offering for sale a wide variety of products. These include drill presses, screw machines, chapers, lathes of many kinds, engravers, millers, face grinders, instruments, coil winders, burnishers, saws and lapping machines. Booth No. 1750. **T-3-1553**



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"DE-STA-CO"
TOGGLE CLAMPS

High holding pressures and precision construction of "De-Sta-Co" Toggle Clamps make this assembly fixture efficient. Locating pins welded to clamp bars locate channels for welding assemblies of varying lengths. Positive holding pressures, up to 4000 pounds in some models, hold parts in close contact essential for good production welding. The same principles apply to your drilling, machining, bonding, gluing or other production processes. Quick toggle action permits fast, safe loading and unloading of fixtures, uniform results, even by untrained workers.

Your nearby "De-Sta-Co" Distributor stocks more than 40 models for your convenience. Contact him at address below or write us for complete catalog.

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GEORGIA
Pye-Barker Supply Co.
231 Pryor Street, S. W.
Atlanta 3

ILLINOIS
George A. Rieke Company
549 W. Washington Street
Chicago 6

INDIANA
General Supply & Tool Co.
140 South Senate Avenue
Indianapolis 4

KANSAS
H-H Tool & Supply Company
105 W. Second Street
Wichita 2

MASSACHUSETTS
F. H. Robertson Co., Inc.
420 Broadway Avenue
Malden 48

MINNESOTA
Northern Machinery & Supply Co.
Lumber Exchange Building
Minneapolis 1

MISSOURI
Ernst Machinery Company
5531½ Troost Avenue
Kansas City 4
H. O. Monahan Co.
474 Paul Brown Bldg.
St. Louis 1

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New York City 12
Root-Neal Company
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Buffalo 10
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Lewis Supply Company
477 S. Main Street
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Dallas 1

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233 Ninth Avenue, North
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a new
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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-156

Twin Mill

The Nichols twin mill is a versatile double-spindle high-precision machine. It is valuable for light-duty work where two surfaces can be milled in a single pass. The machine has two opposed independent geared milling heads powered by pancake type motors, and each has available 15 spindle speeds from 55 to 2080 rpm.

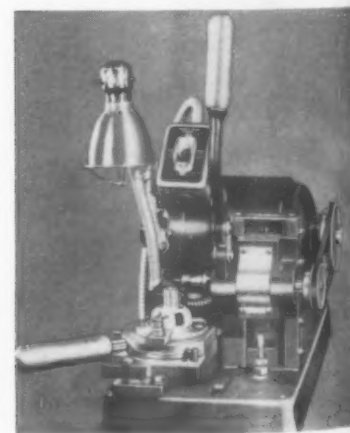


Each milling head is adjustable in three planes: horizontally by means of slides and set screws; vertically; and transversely by feed screws with direct reading micrometer dials. Made by The Nichols-Morris Corp., 50 Church St., N.Y. 7.

T-3-1341

Hand Miller

The high-speed Rouse hand miller handles large or small production quantities of light cuts in brass, aluminum, steel, plastics, iron, copper and other materials. Cuts are made rapidly, accurately and at low cost.



The machine's versatility is considerably increased by a wide variety of attachments. A 1/4-hp, 110-volt, a-c, 60-cycle single-phase motor with swivel motor mount and light is available.

Manufactured by H. B. Rouse & Co., 2214 No. Wayne Ave., Chicago 14, Booth No. 1938.

T-3-1340

THE TOOL ENGINEER'S Service Bureau

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

LITERATURE NUMBER	COMPANY	BULLETIN	DESCRIPTION
3-179	Allison Co., The		Informative catalog on wet and dry cutting of various materials, information on abrasive cutting machines and their maintenance.
3-32	Anderson, F. E., Oil Co.		Twenty-page booklet contains information on machine cleaning, maintenance of Lase! solutions, etc., plus case histories of product at work.
3-341	The Atrax Co.		Complete catalog on precision ground-from-the-solid end mills, rotary files, boring bits, reamers, burs.
3-137	Barnes Drill Co.	Bulletin 352	Bulletin giving information on Barnesdrill Magnetic Coolant Separators.
3-399	Baumbach, E. A., Mfg. Co.		Catalog showing hundreds of sizes and styles of die sets, plus a complete line of stamping accessories.
3-315	Bay State Abrasive Products Co.		"Big Three" catalog containing mounting instructions, recommended speeds, charts, applications, etc.
3-255	Behr-Manning Corp.		"Blueprints" for Faster, Better, Production" gives you series of case studies on new methods and tested coated abrasive products.
3-309	Beely-Wells Corp.		Booklet giving details on Beely-Bowen No. 710 Wet Grinder.
3-164	Chicago Dial Indicator Co.		Folder listing features and specifications of all Geneva Dial Indicators.
3-16	Cincinnati Shaper Co., The	Catalog B-4R	Press brake catalog discusses company's line and advantages.
3-253	Crucible Steel Company of America		Tool Steel Selector aids in choosing proper steel for particular use.
3-342-2	Columbia Enterprises, Inc.		Illustrated catalog on New Columbia No. 2 Vertical Milling Machine.
3-381	Cushman Chuck Co., The	Catalog 64-1951	Catalog covers wrench operated chucks in detail with engineering drawings and dimension data necessary for design and installation.
3-351	Danly Machine Specialties, Inc.		Booklet on Danly die sets stresses precision features of product and resultant economy in time, production and money.
3-313	Delta Power Tool Division, Rockwell Mfg. Co.		Catalog describing solutions of machining problems through application of the Delta Air Powered Hydraulic Drill Unit.
3-153-1	Die Techniques Publishers		Bulletin discusses information contained in company's handbook on dies.
3-365	Dumore Co., The		Catalog discussing company's drill head with automatic built-in controls.
3-358	Eastern Machine Screw Corp., The		Various catalogs describe "Selecting Proper Die Heads for the Job" Style MM, Style DMS, Style DM, and Style TM machine for cutting screw threads.
3-174	Erickson Tools	Catalog J	Describes company's line of precision chucks.
3-407	Ex-Cell-O Corp.	Bulletin 35371	Bushing catalog for engineering and purchasing departments.
3-301	Firth Sterling Steel & Carbide Corp.		Quick reference cards on Firth Sterling standards cutting tools.
3-310-4	Galland-Henning Mfg. Co.	Bulletin SW-1	Bulletin covering company's line of Nopak valves and cylinders designed for air and hydraulic service.
3-34	Hanna Engineering Works		Catalogs describing company's high pressure cylinders, low pressure cylinders and details on cylinder control valves and circuits.
3-259	Hannigan Corp.	Bulletin 210	Illustrated pneumatic cylinder catalog giving design and construction features, bore tables, mounting styles and other information.
3-375	Handy & Harman	Bulletin 11-A	Bulletin gives step-by-step directions for brazing carbide tips and how to join high speed steel tips to tool holders.
3-160-1	Hassall, John, Inc.		Easy to read decimal-equivalent wall chart.
3-222	Henry & Wright		Catalog describing Henry & Wright Dieing Machines.
3-390-2	Kase Machine Co.	Bulletin 13	Bulletin containing sizes, specifications and prices of company's brochures and kits.

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COMPANY

BULLETIN

DESCRIPTION

A-3-360	Kling Brothers Engineering Works.....	Twelve-page bulletin gives information on friction saving principles, processes and applications.
A-3-376	Knight, W. B., Machinery Co.....	Catalog 50..... Catalog giving complete details company's No. 30 precision boring and vertical milling machine.
A-3-21	Lapointe Machine Tool Co., The.....	Bulletin VPU-5..... Bulletin gives specifications of all Lapointe vertical pull-up broaching machines.
A-3-36	Latrebe Electric Steel Co.....	Booklet describing company's line of "Desegitized Hi Carbon-Hi Chromium die steels.
A-3-173	Master Mfg. Co.....	Twenty-four page catalog describing company's line of machine tool attachments.
A-3-364	Metal Carbide Corp.....	Catalog 50-G..... Descriptive catalog on Talldo Tipped Centerless Blades.
A-3-336	Miller Motor Co.....	Bulletin B-200..... Bulletin stressing Miller line of fluid pressure boosters.
A-3-335	Morton Machine Works.....	Seventy-two page catalog showing complete line of fixture clamps.
A-3-193	Newcomer Products, Inc.....	Catalog gives prices and specifications on carbide tools.
A-3-373-1	New Hermal, Inc.....	Two booklets, one on portable and one on heavy-duty models of engraving machines.
A-3-296-1	Oakite Products, Inc.....	Booklet "Some Good Things to Know About Metal Cleaning."
A-3-289	OK Tool Company, Inc.....	Catalog 13..... Latest edition of "Modern Milling Cutters for Modern Milling Machines."
A-3-367	Ortman Miller Machine Co.....	Catalog provides data on line of cylinders. Template the available showing cylinders and mounting brackets.
A-3-229	Parker-Kalon.....	P-K self-tapping screw bulletin, 48 pp. gives complete data. Engineering standards provide data on dimensions.
A-3-363	Plan-O-Mill Corp.....	Booklet on combination three-way machine for internal and external thread milling.
A-3-388	R and L Tool Co.....	Catalog T..... Twenty-eight page catalog describing tools and holders.
A-3-237	Scully-Jones and Co.....	Bulletin 14-50..... Bulletin describes drill stops for control of hole depth.
A-3-201	Sentry Co., The.....	Catalog W-4..... Booklet describes Sentry furnace equipment for heat treating tool steels.
A-3-5	Standard Gage Co.....	Catalog B..... Condensed catalog gives data on gages and indicators.
A-3-398-2	Standard Shop Equipment Co.....	Bulletin A-35..... Data on standardised set-up appliances.
A-3-51	Sandstrand Machine Tool Co.....	Bulletin 717..... Complete set of literature on contour and vertical milling machines, special machines for milling, turning, boring, etc.
A-3-400-1	Swarts Tool Products Co., Inc.....	Catalog 941 illustrates holding fixtures for machine shop production.
A-3-273	Valley Machinery & Supply Co.....	Illustrated catalog describes bracing unit for carbide tool.
A-3-347	Vickers, Inc.....	Catalog 5000..... Booklet describes advantages of complete hydraulic press units.
A-3-161	Viking Tool Co.....	Catalog TE-951..... Introduces new Viking carbide face milling cutter.
A-3-329	Ohio Crankshaft Co., The.....	Booklet "Typical Results of TOCCO Induction Heating in Forging and Forging."
A-3-389	U. S. Tool Co.....	Bulletin 80-E..... Complete specifications on automatic slide feeds.
A-3-408	Wales-Strippit Corp.....	Catalog 10-A..... Illustrated catalog describes Hydra-New-Matic drive in Wales-Strippit equipment.
A-3-373-3	Waukesha Tool Co.....	Bulletin contains specifications on line of standard tools.
A-3-198	Wendt-Sonls Co.....	Seventy-two page catalog gives complete information on entire W-S line of carbide cutting tools.
A-3-321	Wheel Tracing Co.....	Five separate booklets: diamond tools, diamond-forming tools, tips on using diamond tools, dressing tools, Tre-Thread diamond tools.
A-3-147	Wilton Tool Mfg. Co.....	Thirty-two page catalog on work positioners and vices.
A-3-339	Yoder Co., The.....	Illustrated booklet provides data on Yoder slitters for coil stock.
A-3-192	Zagar Tool, Inc.....	Manual E-3..... Engineering manual outlines standard and special tools and machines produced by Zagar.

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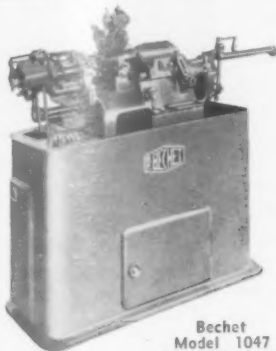
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Automatic Lathe

These are superior machine tools, built to the highest standards of American and European workmanship. Perrish Steel Products is supplying such "hard-to-get" machines every day to many large U. S. Manufacturers, with great savings in delivery time and cost. We invite your inquiry on any machine tool, as many we are able to supply are not listed here.

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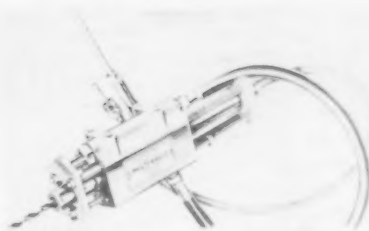
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76 Beaver St., New York 5, N. Y.
Tel: Digby 4-6359
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INDICATE A-3-159-1

Drill Unit



The Commander multi-angle drill units are complete drilling heads powered through flexible shafting and may be attached to existing drill presses or other sources to supply unlimited freedom for setups to handle angle drilling.

The multi-angle drill unit is a precision production tool with thrust ball bearing construction. It has a hydraulic actuated spindle movement and a stroke up to four inches. Made by Commander Mfg. Co., 4225 W. Kinzie St., Chicago 24. Booth No. 1238. **T-3-1591**

Incandescent Lamp

Dazor Mfg. Corp. has developed an air-cooled incandescent lamp for machine-tool operators and other plant



personnel. The cooling is achieved by air entering the reflector at the bottom and moving upward through a ventilating chamber. This flow of air carries off heat, thus keeping the shade always comfortable to handle. Dazor Mfg. Corp., 4481-87 Duncan Avenue, St. Louis 10. Booth No. 845. **T-3-1592**

Drilling Device

This drilling unit, named the Hydr-air, is electrically controlled, but air-powered with the feed rate hydraulic-



ly controlled. Drilling capacity is $\frac{1}{4}$ in. with maximum depth of stroke 4 in. The Hydr-air features rapid advance, controlled feeding through the work and rapid return. Bellows Co., Akron, Ohio. Booth Nos. 1424-1428. **T-3-1593**



Even the

smallest size

Reamers

are Standard

with L & I



The Reamer Specialists

LAVALLEE & IDE, INC.

CHICOPEE, MASS.

INDICATE A-3-159-2

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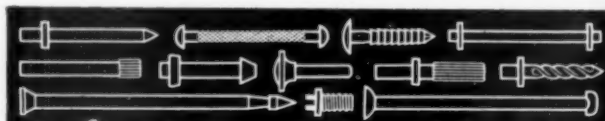
Hassall decimal-equivalent wall chart

FREE

In such popular demand (we've given away 50,000)—we've made it better. The new chart is far easier to read! In three colors to automatically signal decimal-equivalents of fractions. The special products which frame the chart are a constant reminder of a good source for cold-headed parts.

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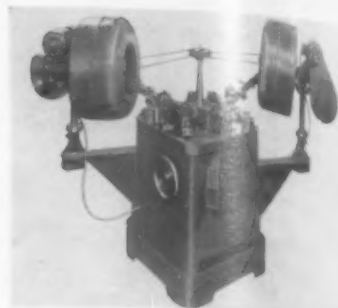
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1/32 - .03125	17/32 - .53125
1/16 - .0625	9/16 - .5625
3/32 - .09375	19/32 - .59375
1/8 - .125	5/8 - .625
3/16 - .1875	11/16 - .6875
7/16 - .4375	23/32 - .71875
1/2 - .5	25/32 - .78125
5/8 - .625	3/4 - .75
7/8 - .875	1 - 1.0
1 - 1.0	

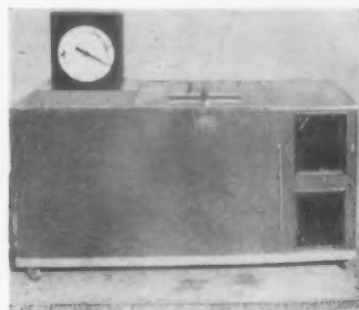
Thread Roller



The Prutton Model No. 125 Roller thread roller is claimed to average 18,000-20,000 pieces per hour net production including setup, Class 3 fit with a considerable increase in die life as well. The machine threads bolts, letter rings and spiral nails as well as performing many knurling, marking, serrating, necking and contour operations. Made by the D. H. Prutton Machinery Co., 5295 West 130th St., Cleveland. T-3-1601

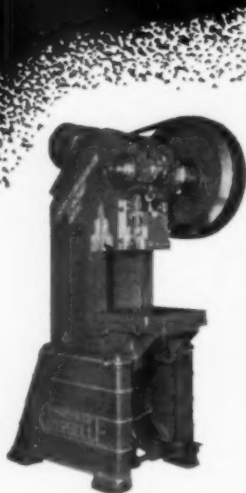
Industrial Freezer

This two-cubic-foot industrial freezer is designed for -150 deg F, and is controlled by a Brown electronic controller. The freezer is finished in stainless steel and has six inches of Santocel or ultra-light insulation. The refrigerant used is harmless and the temperature can be controlled within a tolerance of two degrees.



The entire freezer is mounted on ball bearing swivel type casters and surrounded by a heavy angle iron base for protection. The freezer operates on 110 or 220 volts, 60 cycles ac, and the compressors are air-cooled. Other sizes and models are available. Webber Appliance Co., Inc., 2740 Madison Ave., Indianapolis 3. Booth No. 241. T-3-1602

EFFICIENT—LOW COST PRODUCTION MEANS **ROUSSELL** PUNCH PRESSES

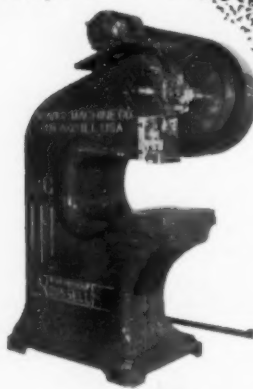


OBI PRESS
A rugged Open Back Inclinable Press designed for efficient low cost production.



HORN PRESS
Adjustable bed provides wide range of die space. Bed easily removed for horning dies or special applications.

See Us at Booth 1804 ASTE Industrial Exposition March 17-21



DEEP THROAT
Can fabricate large pieces and jobs requiring more working space due to throat depth.

SERVICE MACHINE COMPANY

7627 S. Ashland Ave.

Chicago 20

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Design Engineering

The Euclid Tool Engineering Co., 14689 Euclid Ave., Cleveland 12, is a design organization which specializes in dies, jigs, fixtures, special tooling, special machinery, product development and technical art. Booth No. 545.

T-3-1603

Dial Groove Gage

The Nilco dial groove location gage is a simple, portable, light dial indicator gage to check the location or the depth of an internal groove. The trigger application controls the gaging unit, collapsing it to enter the bore. A spring return holds the part as if clamped when the trigger is released and a vibrating movement sets the gaging pin



in place for checking in the groove, giving a quick, accurate reading. Made by the Nilsson Gage Co., Inc., Lake and Fairview, Poughkeepsie, N. Y. Booth No. 533. **T-3-1611**



500-ton Press

Verson Allsteel Press Co., 1355 East 93rd St., Chicago 19, is introducing a 500-ton press for nicking and breaking steel billets used in forging large caliber projectiles. The company also manufactures high production stamping and forging equipment and related tooling. Booth No. 2031. **T-3-1612**

Die Handler

A rugged die handler has been developed by the Hansford Mfg. Corp., 1239 University Avenue, Rochester 7, N. Y. The die handler is a device for handling and taking apart heavy dies.

It will handle dies up to 23 in. wide, 43 in. long, shut height from 9 to 14 in. and weighing up to one ton. The upper platen is mounted on heavy hardened steel trunnions running in anti-friction bearings and may be rotated 360 deg. Booth No. 150. **T-3-1613**



New VIKING

CARBIDE FACE MILLING CUTTER

IMPORTANT FEATURES

1. Low Initial Cost
2. Longer Blade Life
3. Lower Grinding (Sharpening) Cost
4. Easier Reblading



Large carbide tips have just sufficient steel backing to effect the addition of serrations to backs of blades.

Amount of steel brazed to carbide is negligible and the heavy carbide tips remain the dominant material, thus eliminating tendency of bi-metal cracking under thermal strains.

Write for Catalog TE-951

Also Makers of Single Point Carbide Tool Holders

VIKING TOOL COMPANY SHELTON, CONN.

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MAGNETIC CHUCKS BY *Magna-Lock*

...largest exclusive builder of magnetic chucks

3 TYPES
for every flat-
surface machining
job ... large or small!

RECTANGULAR ... work held
to extreme edges of chuck. Sizes
to 36" x 96".

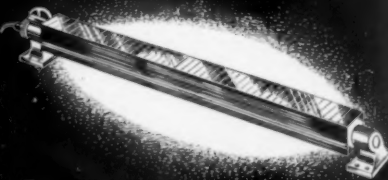
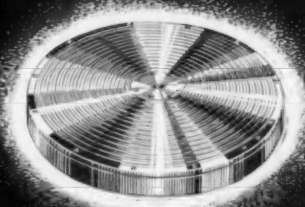
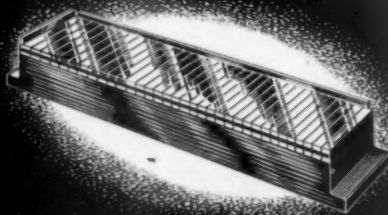
ROTARY ... inserted ring-type,
6 1/4" dia. to 48 1/2" dia. Also
sectional type for automatic
loading, unloading.

SWIVELING ... for knife and
shear blade grinding, many
machining operations.



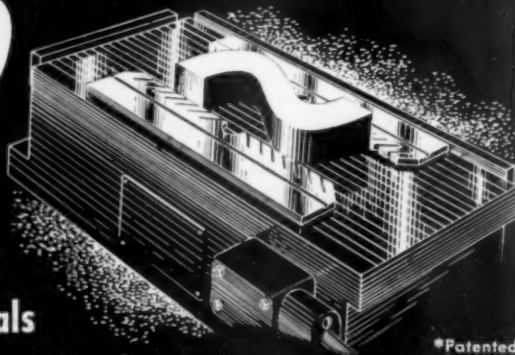
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Magna-Lock Mag-
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Devices.

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TE-32



HOLD

**BRASS GLASS
ALUMINUM**
...any rigid non-
magnetic materials
on your
**MAGNETIC
CHUCKS!**



*Patented

Magna-Vise ^{*}**DOES
IT!**

Hanchett **MAGNA-LOCK
CORPORATION**

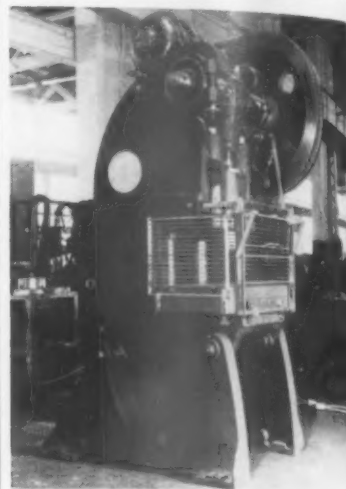


Magnetic Chucks and Devices

BIG RAPIDS MICHIGAN, U. S. A.

Open Gap Presses

Open-gap "anti-deflection" presses built under patents of Rhodes, Wakefield, England, are offered by Hercules Presses, Ltd., Toronto 12, Ont. The purpose of the design of these presses is to



reduce the cost of dies, particularly the complicated and expensive types. Two design changes are greatly improved means of guiding the ram and a method to keep the ram face and the surface of the bed or table parallel with each other in spite of frame deflection when the load is applied. Booth No. 1031.

T-3-1621

Work Positioner



The Powrarm work positioner will position assemblies at any angle on a 360-deg horizontal plane, a 360-deg axial plane or a 180-deg vertical plane and in any combination of positioners simultaneously. The work positioners are particularly adaptable for the assembly of small or medium size articles. Wilton Tool Mfg. Co., 925 Wrightwood Ave., Chicago 14. Booth No. 237.

T-3-1622

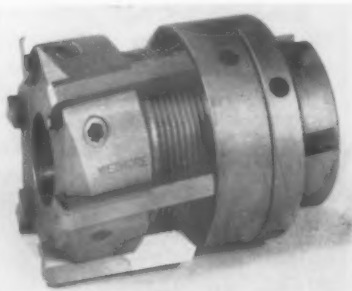
Optical Projector

The contour measuring projector made by Bausch & Lomb is a single unit of the enclosed type. The projector



cabinet is divided into three parts. The upper part is a light-tight welded steel hood, through which the light beam passes to form the image on a screen which is at average eye height from the floor. The lower front compartment houses the mechanism, while there is a storage space in the rear. Bausch & Lomb Optical Co., Rochester 2, N. Y. Booth No. 813. **T-3-1631**

Inserted Blade Reamers



Wetmore Reamer Co. of Milwaukee manufactures adjustable inserted blade reamers. Wetmore standard tooling includes solid shank reamers with either straight or Morse taper shanks; also available in a short length of shank series. Inserted blade shell type reamers are made as standard in a size range of 1 1/4 to 6 in. diam. All tools are available with HSS or TCT blades. Booth No. 747. **T-3-1632**

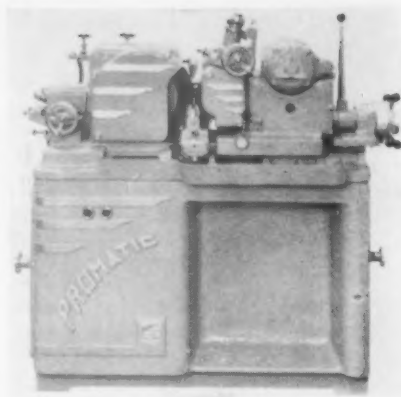
Gaging Instruments

Among the products handled by the Engineering Specialties Div., Universal Engraving and Colorplate Co., Inc., 980 Elliott St., Buffalo 9, are optical comparators and contour projectors, chart-gage screens for use on all makes of optical comparators and contour projectors, staging fixtures for use with the above instruments, jet blade and die contour checkers and fixture bases. Booth No. 633. **T-3-1633**

Centerless Grinder

Known as the Promatic No. 1, a centerless grinding machine will handle average size work in a small floor space.

It has a massive spindle and is built throughout with exceptional rigidity assuring close tolerance and long life. The regulating wheel has infinitely variable speeds of from 35 to 350 rpm. Maximum stock diameter capacity is 1 1/4 in. Diversified Metal Products Co., 5125 Alcoa Ave., Los Angeles 58. Booth No. 1239. **T-3-1634**



FOR *Dependable*

Service AND

Quality...



LAYSTROM ENGINEERING CO.

DIVISION OF LAYSTROM MFG. CO.

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CHICAGO 39, ILLINOIS

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Cutting Tools

Waukesha Tool Co. makes a complete line of cutting tools including a short shank inserted blade reamer and shell reamer. The short shank model is available in a straight or tapered shank, and both the short shank and the shell reamer offer a choice of carbide-tipped blades or high-speed steel.

Advantages are that these reamers are adjustable and offer great economy in maintenance. When blades become worn they are easily replaced. The reamer body lasts indefinitely. Booth No. 643.

T-3-1641

Open-Back Press

The Sales Service Machine Tool Company announces a new 60-ton open-back inclinable press-rite power press. Featuring a one-piece, heavy duty, special alloy frame, with built-in tie-rods, the 60-ton press insures rigidity and strength. With built-in tie-rods of high tensile steel providing heavy reinforcement to the gap of the press, deflection on heavy work is eliminated, and larger die space with added strength is provided. The design of the one piece tie-rod frame reduces binding or misaligning of dies on extra heavy drawing and blanking operations. Booth No. 1621.

T-3-1642

Pedestal Grinder

Reuland Electric Co., Alhambra, Calif., manufacturers of electric motors, have announced the development of a new line of pedestal grinders, buffers and sanders. These units incorporate the company's motor and provide many new features. Reuland Utility units are versatile and are suited to all types of medium or heavy-duty shop work.

Typical features of Reuland Utility grinders are: Grinding surfaces on worn wheels are always accessible. Assures maximum usage. Permits easier positioning of work. Tool rests can be moved in any direction. Hinged guard cover flips up to expose entire wheel. Uses up to 14 in. x 2 in. wheels. Extra large and adjustable for positive worker protection. Manually operated starter switch furnished as standard equipment. Magnetic starter optional if desired.

The Reuland Utility special has a totally enclosed induction motor. Oversized ball bearings are sealed and lubricated for life. Motor attains full speed instantly. Available for 110 and 220-volt single-phase, 208, 220/440, 380 and 550-volt, 3-phase.

T-3-1643

PRECISION GAGES for PRECISION PRODUCTION

Geneva DIAL INDICATORS

Accuracy - Long Life - Low Cost

Here is a complete line of accurate indicators with the same precise workmanship characteristic of Geneva Lens Measures for opticians, and Geneva Depth Gages for engravers . . . their standard since 1896.

The simplicity of the Geneva movement is the secret of its accurate dial indicator readings. With a lever arm instead of a multiplicity of gears, the Geneva Dial Indicator has fewer moving parts . . . this means lower cost, and less chance for trouble and repairs.

Purchase Indicators Individually or in this

Machinist - Tool Maker - Inspector Set



Includes Indicator, A.G.D. standard points, internal attachment, tool post holder, upright spindle, universal holding sleeve, universal back, threaded shank, clamp—in sturdy, metal box

Set 125U—with .001" graduated Indicator . . \$22.50
Set 135U—with .0005" graduated Indicator . . 24.50
Set 145U—with .0001" graduated Indicator . . 37.50



This folder lists features and specifications of all Geneva Dial Indicators.
Free copy sent on request.

Profitable territories available to qualified dealers.

CHICAGO DIAL INDICATOR CO.

Dept. L, 180 N. Wacker Drive, Chicago, Illinois

Chicago Dial Indicators will be exhibited at
the TOOL ENGINEERS INDUSTRIAL EXPOSITION,
Chicago, Ill. March 17-21, 1952, Booth No. 511.

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NO. 125F
Graduated: .001"
Range: .200"
Revolutions: 2
\$10.00
with plain back
and one point



NO. 135F
Graduated: .0005"
Range: .125"
Revolutions: 2 1/2
\$12.00
with plain back
and one point



NO. 145F
Graduated: .0001"
Range: .060"
Revolutions: 6
\$25.00
with plain back
and one point

Imported Lathes, Mills

Demoor lathes, built in Belgium, are offered for sale here by Stokvis, Edera and Co., 21 East 26th St., New York 10. The firm also is representative for Gilly horizontal boring and milling machines.

The lathes are made up of two series, the Magic Eye and the Box Bed lathes.

The Gilly boring and milling machines include five table models and two floor models. Booth No. 1028.

T-3-1644

Radiation Detector

To supplement its equipment for protection of personnel and property in all industries, Mine Safety Appliances Co., Pittsburgh, now is handling a line of radiation detection instruments manufactured by Beckman Instruments, Inc., and the Arnold O. Beckman Co.

Due to the increasing use of radiation in research and many industrial processes, including the atomic energy field, detection of radiation hazards is an integral part of safety and industrial hygiene programs.

The Beckman instruments now handled by Mine Safety Appliances Company include a portable Geiger counter, portable Beta-Gamma survey meter, a-c operated Beta-Gamma monitor, portable Gamma survey meter, pocket dosimeter and charging unit for pocket dosimeter.

T-3-1645

Die Handler



A die handler has been developed by the Hansford Mfg. Corp., 1239 University Ave., Rochester, New York for the safe handling and taking apart of heavy dies.

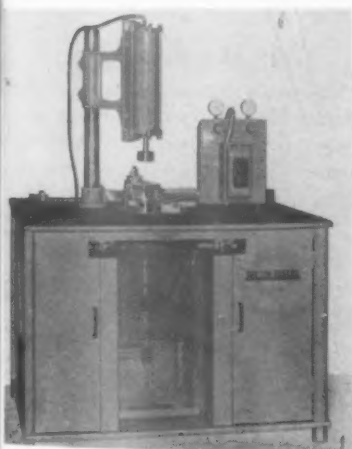
This machine is ideal for taking a die apart for inspection. Also in the assembly of the die it is of great assistance, doing away with the slow, unsafe, and cumbersome block and tackle procedure.

The unit is mounted on four heavy casters which makes it readily movable. Four cam operated legs are provided to raise the machine off the floor and level the work for machining or drilling.

T-3-1651

Shell Trimmer

The model ST-2 drawn shell trimmer is capable of trimming square, rectangular, round or irregularly shaped shells. The main work spindle is power-driven by a 3-hp motor while the



hold-down cylinder and external cutter are pneumatically operated. The machine also beads, knurls and forms with all operations completed in one work cycle. Dayton Rogers Mfg. Co., Minneapolis 7, Booth No. 1843. **T-3-1652**

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Rolling Precision Aircraft Parts

on **REED** Cylindrical Die
Thread Rollers



The Aircraft Industry selects the Thread Rolling Process as the preferred method of threading aircraft parts.

Thread rolling reproduces the precision thread form of the thread rolling dies and maintains the original accuracy of the setup over long runs.

The cold forging action of thread rolling produces a thread that is substantially stronger and tougher than similar threads produced by other processes.

Send us specifications of your requirements and let us supply you with complete information.

REED ROLLED THREAD DIE CO.

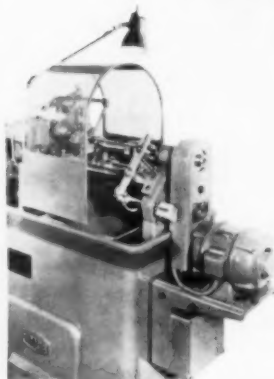
Manufacturers of
THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS
Worcester, Massachusetts, U.S.A.

TE-023

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-165

PRECISION TURNING EQUIPMENT BY

"GUTHERY"



Traub Automatics 19/32, 13/16, 1",
1-13/32"

Traub Threading Machines

Traub Bar Pointing Machines

Traub Slotting Machines

Traub Plastics and Wood Turning Auto-
matics

Traub Service In Your Plant By Trained Per-
sonnel. Traub Parts Carried in Stock. Traub
Cam & Formtool Making Service Available.

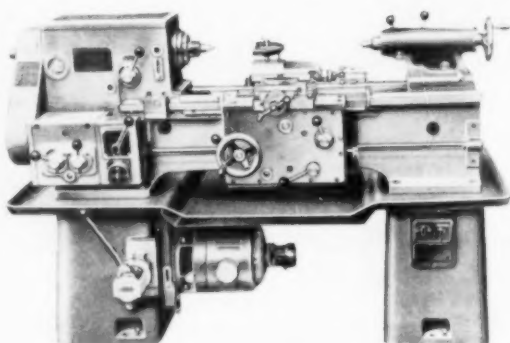


Leinen Handscrew Machines—Turret
Lathes

Leinen Precision Screw Cutting Lathes

Leinen Precision Plain Lathes

WEISSER HEILBRONN



Weisser Engine
Lathes

Weisser Tool Room
Lathes

Weisser High Speed
Production Lathes

YOU ARE CORDIALLY INVITED TO VISIT OUR
BOOTH #1827 AT THE ASTE SHOW IN CHICAGO
THE WEEK OF MARCH 17-21, TO SEE OUR
MACHINES IN OPERATION.

EXCLUSIVE U. S. DISTRIBUTORS

GUTHERY MACHINE TOOL CORPORATION
SALES • SERVICE • PARTS
130 West 42nd Street New York 18, N. Y.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-166

Pneumatic Comparator

In Moore pneumatic comparators the pneumatic measuring signal is brought to a Moore precision relay which amplifies the input signal 1:25.



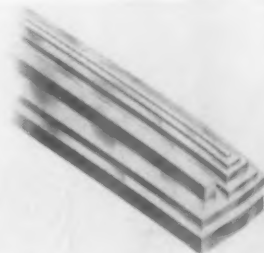
and operates an air-electric switch in the sorting mechanism. The sharp cut-off action of these relays can be demonstrated by sorting parts to 0.0001 in. A typical completed unit measures the average OD of bushings at the rate of 7200 per hour. Made by Moore Products Co., Philadelphia 24. Booth No. 824. T-3-1661

Boring Bar Holders

Bars are available for use on turret lathes, with boring bar holders specially designed for this application. Holders are adjustable to sizes for various lathes, bushings being furnished with each bar. These boring bar holders are claimed to afford greater rigidity, always keeping boring bars in horizontal position, regardless of changes in lathe size, within certain limits. They are made of case-hardened alloy steel by the Evered Tool Co., Chicago 39. Booth No. 1012. T-3-1662

Air Hardening Steel

Simonds Saw and Steel Co., Fitchburg, Mass., now offers an air hardening type of die steel for longer lasting



punches and dies where greater production runs are desired between sharpenings. This steel has the following chemical analysis: Carbon, 0.95-1.05; Manganese, 0.50-0.70; Silicon, 0.30-0.50; Chrome, 5.00-5.50; Molybdenum, 0.90-1.10; Vanadium, 0.20-0.30.

Furnished in 43 standard stock sizes from 1/2 in. x 2 in. to 2 in. x 10 in. in 36 in. lengths. Booth No. 1314. T-3-1663

The Tool Engineer

Height Gage Indicator

The model B-1 height gage indicator is a laboratory or toolroom inspection instrument with but one moving part which is re-mounted, making it sectionless. This construction, combined with its electronic parts, gives it accurate repeat characteristics.

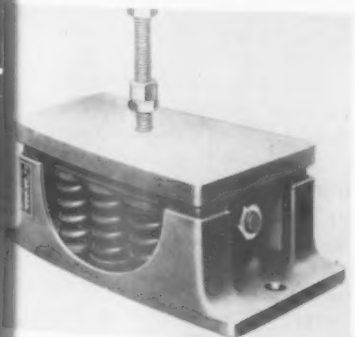


The Merz electronic gage is complete with an adapter for standard height gages and its own stand. The gage is equipped with two stages of amplification, each graduation being 0.00001 in. on the "A" scale or 0.0001 in. on the "B" scale with a maximum range of 0.006 in. All gages are designed so that elementary maintenance can be performed by the operator.

Merz Engineering Inc., 200 S. Harding St., Indianapolis, Ind. Booth No. 104. **T-3-1671**

Vibro-Isolator

The type LK Vibro-isolator consists of a semi-steel cast housing incorporating one to nine hard-drawn, oil-tempered, crucible steel springs, the number depending on the size of the unit and the application. The upper and lower members of the housing are held in their relative positions against lateral movement by four resilient inserts acting as chocks. The equipment to be

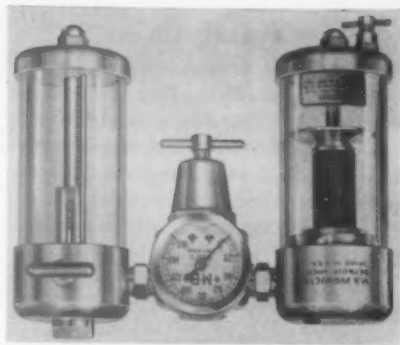


isolated is fastened to the top plate by means of a bolt which passes through the machine base. This bolt bears on the spring compression plate and thus transfers the load to the vibration absorbing springs. The Korfund Co., Inc., 15 Thirty Second Place, Long Island City 1, N. Y. Booth No. 1011. **T-3-1672**

Air Line Protector

This unit is a combination of the "Whirl-A-Way" automatic air line filter, air pressure regulator, and automatic air line lubricator, offering protection for air valves, cylinders, controls, pneumatic tools, etc. The filter is designed for extremely wet air lines, which are desired to be very dry.

The automatic air line lubricator delivers the correct amount of oil. The automatic air line regulator is capable of passing a large volume of air with an unrestricted flow and minimum amount of pressure drop. It is self-bleeding, compact, light weight. Holds secondary pressure from 3 to 130



pounds. Any of the above three devices can be used as separate units or in any combination. M-B Products, 46 Victor Ave., Detroit. Booth No. 1217. **T-3-1673**

Rectangular ..

Swivelling ..

Vacuum ..

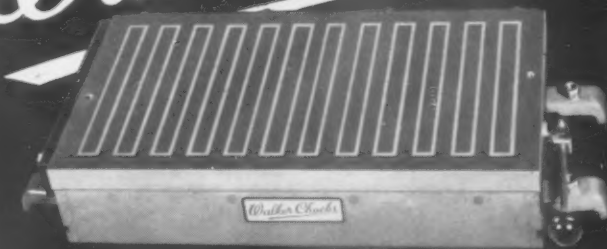
Rotary ..

Planer Parallels ..

Demagnetizers ..

Special Types ..

Walker Chucks



Walker Magnetic Chucks are designed for three absolute essentials . . . Polarization, Saturation and Balance. That is why Walker Chucks hold firmly at all points. Walker Magnetic Chucks are basic because: 1. Complete polarization of work piece. 2. Minimum saturation of chuck. 3. Essential magnetic balance of circuit. Over sixty years' broad experience in chuck design and manufacture is behind every Walker Chuck.

Original Designers and Builders of Magnetic Chucks

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

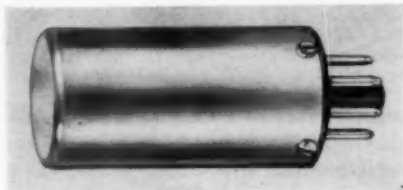
In Canada—Upton Bradeen & James, Ltd.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-167

Crystal Oven

A miniature crystal temperature control oven, the JKO-2T, has been announced by The James Knights Co., Sandwich, Ill., for crystal units normally in the frequency range of 16 kc to 200 kc.

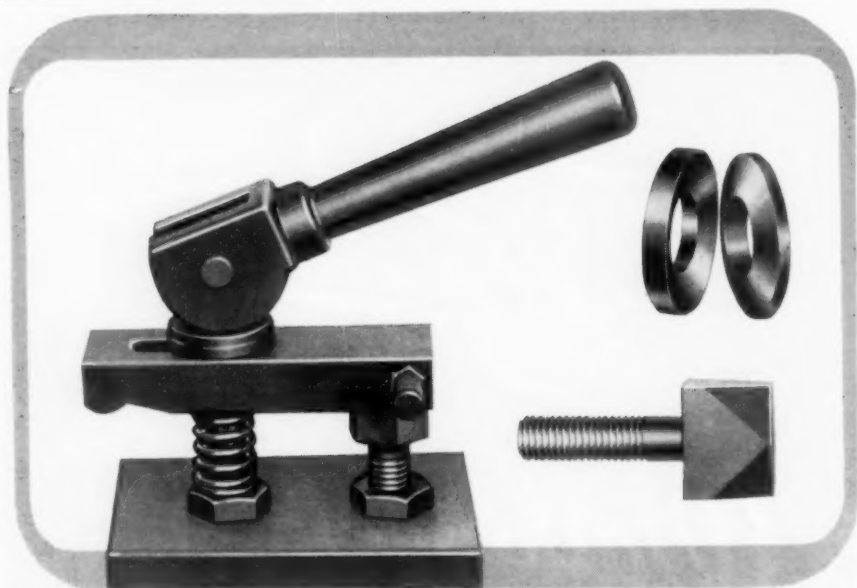
This compact unit provides tempera-



tures stabilization at 75 deg C \pm 2 deg for one or two type H-17T (Military Type HC-13/U) crystal units in ambients from -55 deg to +70 deg C. Standard octal base; overall width, 1.28 inches; height, less pins, 2.41 inches. Heater, 6.3V ac or dc at approximately 1.40A. Power consumption at +25 deg C, 3.3 watts; at -55 deg C, 6.8 watts.

The JKO-2T is electrically interchangeable with the JKO-2 oven, the two types providing temperature stabilization over the entire range of frequencies available in miniature, hermetically-sealed, military type crystal holders.

T-3-1681



Lodging Details and Clamp Assemblies available at your nearest distributor:

The Robert E. Morris Company
967 Farmington Ave.
West Hartford, Conn.

3142 Fairfield Ave.
Bridgeport, Conn.

51 Hayward Street
Cambridge, Mass.

Ramsdell Industrial Supply
66 Southbridge Street
Worcester, Mass.

E. W. Larrabee Inc.
103-14 Roosevelt Ave.
Corona 68, New York

Buffalo Rubber & Supply
37 Carroll Street
Buffalo, New York

Breidster Haefter Company
259 East Wells Street
Milwaukee 2, Wisconsin

Gullberg Die Supply Company
2679 East Grand Boulevard
Detroit 11, Michigan

The Donald B. Hunting Company
Seward Road, R. R. 8
Hamilton, Ohio

The Cleveland Duplex Machinery Co., Inc.
Penton Building
Cleveland 13, Ohio

Catalog and Tracing Templates, on Request
VISIT OUR EXHIBIT BOOTH 338 ASTE SHOW

LODDING, Inc.
WORCESTER, MASS.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-168

Toggle Clamp

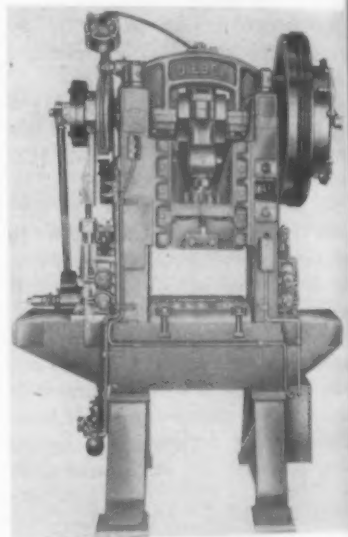
A large push type toggle clamp is being produced for larger, heavier structures. This clamp, No. 132-A is especially suited for use in production of large defense items such as planes, tanks, armored trucks, etc. It has a plunger 1 in. in diameter with a 2 1/2 in. stroke; ultimate load, 10,000 lb. Constructed of solid bar stock, these clamps will stand heavy operation and provide long, efficient service. The ground plunger and broached guide hole permit accurate locating as well as clamping operations. Wolverine Tool Co., Detroit 7.

T-3-1682

Automatic Press

Di Machine Corp., 2711 W. Irving Park Road, Chicago 18, Ill., has developed a high-production fully automatic press known as the "Diebel Di-Matic."

Designed to meet the most modern press requirements, for both accuracy of alignment and speed in operation in precision stamping, the 40-ton Di-Matic produces intricate piece parts from the most complicated progressive dies, its rigidity assures longer die-life.



The Di-Matic features include an air operated and electrically controlled friction clutch and brake; air ejector and cam; metered lubricating system; cylindrical slide 16 in. in diameter guided by adjustable retainers with 380 square in. of contact area.

Other features include a knock-out bar for compound dies; built-in scrap-cutter; 5 hp vari-drive motor; air clamped roll feed, driven by rack and pinion, with Formsprag overrunning clutch equipped with double ball bearings, and specially designed spring and rubber shock mounts.

Provision is made in the electrical control circuit for use of safety shut-off device, giving maximum protection for press and die.

T-3-1683

Speed Reducer

Footo Bros. Line-O-Power drives incorporate Duti-Ring gears which have hard tooth surfaces and ductile cores, assuring long wear life. The compact, modern design is ideal for original equipment or for replacement purposes.



Line-O-Power drives are available in double or triple reductions with ratios from 5 to 1 up to 238 to 1, and capacity range from 1 up to 178 horsepower. Made by Footo Bros. Gear and Machine Corp., 4545 S. Western Blvd., Chicago 9. Booth No. 1109. T-3-1691

Tap Grinder

Model 1100 Hybco tap grinder is a machine for reconditioning and sharpening taps. Its capacity range is from No. 0 machine screw to 1½ in. hand taps with various numbers of flutes by using the chamfering sharpening head.



Chamfers can be ground and relieved to any desired angle and with any amount of relief. Straight flutes can be sharpened to increase or decrease hook angle and spiral points reproduced in any manner desired. Made by the Henry P. Boggis Co., 706 East 163rd St., Cleveland 10. Booth No. 1709.

T-3-1692

Diamond Matrix

Precision Diamond Tool Co., Elgin, Ill., announces the introduction of the newly developed P. S. M., the matrix that securely mounts the diamond in the tool.

The alloy used in this new matrix wets the diamond, i.e., adheres to it under normal and rough usage, and has the same coefficient of expansion as the diamond, which prevents the diamond from vibrating loose or perishing.

P. S. M. makes grinding wheels more efficient, causes less overall wear of the diamond and means longer life for diamond tools. Booth No. 313. T-3-1693

Comparators

Jones and Lamson Machine Co., Springfield, Vt., announce that seven different models of optical comparators are available. Three attachments for these instruments include a power elevation attachment which is a self-contained motor drive unit to raise or lower the worktable. A tracing attachment is used for inspection surfaces that cannot be projected or reflected. A six-inch lens (5x) makes it possible to measure or compare on a 30-in. screen any object which will fall within a 6-in. circle. Booth Nos. 1411-1417-1425.

T-3-1694



What a relief!

Better Cutting-- Greater Tool Life

Any good grinder hand can now produce this stronger, cleaner, faster cutting grind easy as regular relief. Let us send you our catalog that describes what D.S. can do to cut your tool and machining costs. Illustrates the new motorized model.

SEE IT—A.S.T.E. SHOW BOOTH #111

D·S
Radial Relief
TOOL GRINDING
FIXTURE

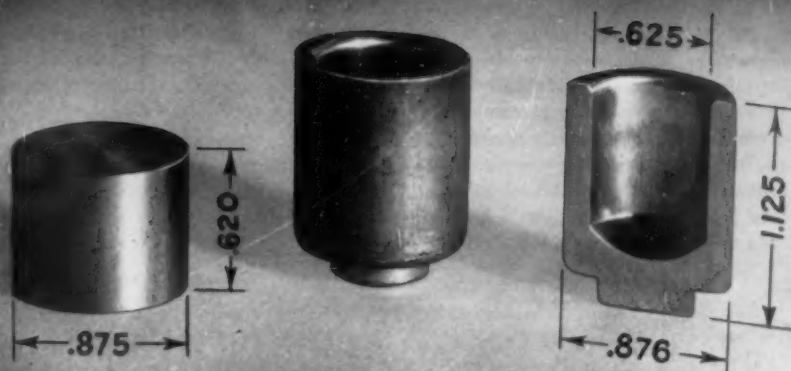
Available with
or without
grinder and
base.



D · S GRINDER DIVISION
Royal Oak Tool & Machine Co.
621 E. Fourth St. • Royal Oak, Mich.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-169

COLD FORM STEEL LIKE THIS...



practical today with
new EXTRUDITE process

Cold steel forming operations have great new horizons because of a new method of surface treatment—the *Extrudite* Process. This Detrex development for coating steel produces a dry, clean, heat-resistant lubricating film which is integral with the work surface. As a result the film stretches with the metal throughout the most severe drawing and extrusion operations. Metal-to-metal friction between dies and work is eliminated!

On operations like deep drawing, cold heading, wire drawing, tube drawing and extrusions at room temperature, the Extrudite Process provides tremendous savings . . . operations are speeded up

with present equipment, dies last longer and many process anneals and chemical treatments are eliminated.

If you cold form steel, the Extrudite Process provides substantial benefits. Get the facts in Chicago at the ASTE Show or write direct for our bulletin.



DETREX

BOX 501, DETROIT 32, MICH.

Corporation

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-170

170

Load Conveyor

Extra light and of high capacity, the new Market Forge Load-Veyor is designed to handle heavy loads. This 12 in. wide heavy duty Load-Veyor is made in 5 ft and 10 ft sections with 45-deg and 90 deg curves to suit special and individual needs. Ball-bearing wheels 2 in. in diameter and 5/8 in. wide are spaced on slightly less than 3-in. centers. It is available with welded-on connectors which are inter-connectable with the majority of other wheel conveyors of the same size. It can also be supplied with Market Forge removable type connectors.



Extra strength and durability is provided by use of tension members without the addition of unnecessary weight. The weight of a 10-ft section is only 69 lb. The standard arrangement is with the wheels set above the side channels.

Actual tests have proved that with a load of 2000 lb distributed over the surface of the conveyor supported on only two stands, one at each end, there is less than 3/8 in. deflection at the center, making the Load-Veyor practical for heavy loads without extra supports or stands.

The Load-Veyors are rated to take loads of 1000 lb covering the surface of the conveyor and for individual loads up to 300 lb per unit.

The side channel members are joined by inverted angles welded to both side channels. There is one at each end and one in the center on 10-ft section. This arrangement of inverted angles receives the adjustable stands and also strengthens the frame. Market Forge Co., Materials Handling Div., Everett 49, Mass. T-3-1701

Cutting Fluid

Lusol, an all-chemical cutting fluid is featured by the F. E. Anderson Oil Co., Portland, Conn. Lusol was developed and engineered to control temperatures at the cutting point of the tool so that tools, chips, and workpieces stay at constant low temperature during the machining operation. The manufacturer claims that Lusol is a coolant, cleanser, lubricant, rust preventive and water conditioner all in one. Booth No. 1308.

T-3-1702

The Tool Engineer

Wooden Shelving

15, and in the mid-west states by

Electric Counters



The Durant Manufacturing Co., 1929 No. Buffum St., Milwaukee 1, announces an addition of two new electric units to its line of Productimeter counting and measuring machines. Except for size, these companion models are identical in design and appearance.

The smaller, identified as the Y Electric, is for light applications where reading is done at close range and operates at speeds up to 1,000 counts per minute. The second unit is the CS Electric for heavy industrial applications and features larger figures for distant reading. The speed is up to 800 counts per minute. Booth No. 837

T-3-1711



Pocket Comparator

The pocket comparator made by Bell & Howell is an optical measuring instrument which can be used in various industries where it can be adapted to the required inspection procedures. It is distributed by the National Tool Co., 11200 Madison Ave., Cleveland. Booth No. 1815.

T-3-1712

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Air Gage

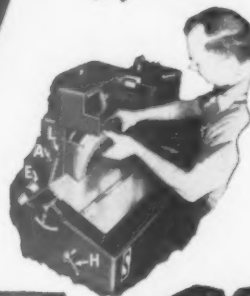
A small air gage for gaging small holes has been announced by the Taft-Peirce Mfg. Co., Woonsocket, R. I. Called the Comp-Air-ator, the device utilizes the flow-metering principle of measurement. Since it is not necessary to build up a back pressure in a flow system, the gaging nozzles can be extremely small, which in turn permits very small gaging members. Flat plugs have been constructed for slot measurement as small as 0.038 in. Booth Nos. 620-621.

T-3-1713



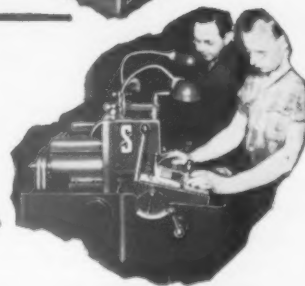
10" or 14"
TWIN WHEEL
WET OR DRY
TOOL GRINDER
FOR CARBIDE, STELLITE OR HIGH SPEED STEEL TOOLS

*one step
from rough
to finish grind*



(Right) Mounting a new wheel in 5 minutes!

(Right) Operating view of 10 TD shows ample room to comfortably serve two operators. (Twin lights are optional.) Complete operator comfort when grinding wet. Absolutely no spray or splash.



UNIVERSAL PRECISION PROTRACTOR—TOOL GUIDE with DRESSER grind any size tool for any desired angle.

WRITE FOR BULLETIN TW

THE STANDARD ELECTRICAL TOOL CO.

2499 RIVER ROAD
CINCINNATI 4, OHIO

ALSO:

GRINDERS—ALL KINDS! UP TO 100 H.P. BUFFERS—POLISHERS UP TO 60 H.P. ABRASIVE BELT MACHINERY. SPECIAL MACHINERY. TWIN WHEEL TOOL GRINDERS.

VISIT OUR BOOTH 1727 AT THE ASTE INDUSTRIAL EXPOSITION CHICAGO, ILLINOIS, MARCH 17-21

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-171



Wooden Shelving

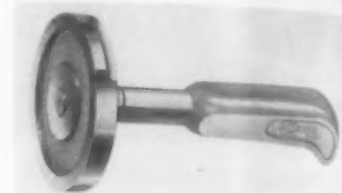
Of Swedish design, Lundia shelving is constructed on the self-tension principle in a range of standard sections particularly adaptable to industrial storage. Neither tools nor carpenters are needed for the installation of Lundia shelving. Anyone can rapidly set it up, adjust or dismantle it. Another feature is the way Lundia combines simplicity of design with great strength. Each shelf is guaranteed to support up to 700 lb.

It is distributed in the eastern United States by Storekeeping Specialty Supply Corp., 509 Willis Ave., New York

15, and in the mid-west states by L. Paulle-Midway, 407 North Hamilton Ave., St. Paul, Minn. T-3-1721

Plug Gage

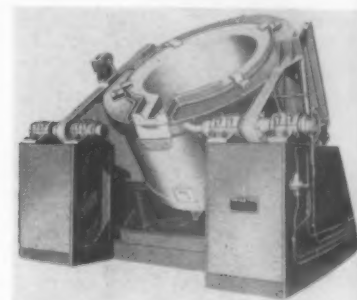
The Bubo plug gage, made by Standard Gage Co., Inc., of Poughkeepsie, N. Y., is based on the spherical principle of gaging bores and results in several important advantages according to the manufacturer.



Seventy to 80 percent lighter than the conventional type, the Bubo plug gage reduces operational fatigue, and is much more accurate when the bore diameter is close to the tolerance limit. This gage can also "explore" the bore for dimensional deviations. Booth No. 532. T-3-1722

Melting Furnace

A 25,000 lb hydraulic tilting type melting pot furnace has been designed and manufactured by Bellevue Industrial Furnace Co., 2620 Crane Ave., Detroit 14. This installation is used for Kirksite metal. Furnace and pot



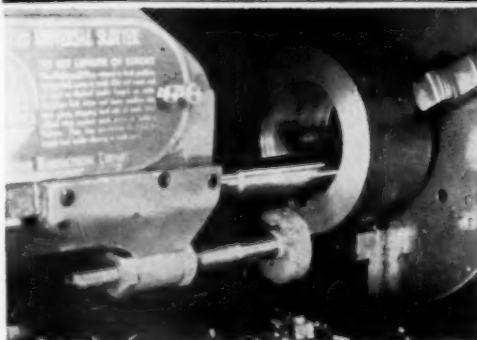
are tilted by means of hydraulic cylinders which are completely piped with flow control valves installed in oil lines, allowing adjustment of flow control to give desired tilting speed. The return stroke is double control; (1) A cam flow adjustment to allow a limited rapid return to stop the pouring of the metal. (2) A flow control to permit remainder of return stroke to cushion furnace into return position. A lever handle control valve is mounted on side of furnace structure convenient for operator to observe the pouring of the metal while operating the furnace. Metal is heated by means of burners mounted below the pot, firing tangentially to the internal lining. This gives a uniform heat distribution and avoids flame impingement on the pot contributing to longer pot life and minimizing maintenance cost. T-3-1723

The Tool Engineer

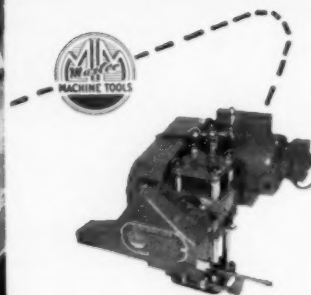
"See In Operation at the ASTE Show, Booth 205, Upper North Hall"

**more
OPERATIONS**

ON YOUR LATHE, TURRET, OR MILL
with
**MASTER MACHINE TOOL
ATTACHMENTS**



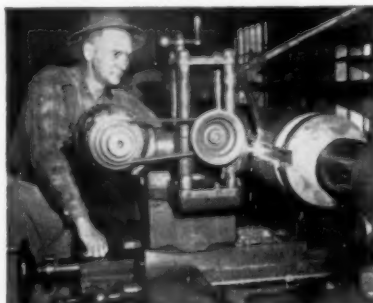
INTERNAL KEYWAY CUTTING WITH
MASTER SLOTTING HEAD ON A LATHE



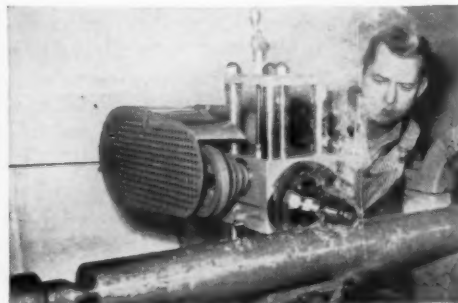
Master Universal
Slotting and Keyseating Head

The multi-purpose Master milling, grinding and keyseating attachments increase the facilities and capacity of your lathes, turrets, or mills, in maintenance shops, tool rooms, as well as production shops. For the cost of one single-purpose machine, you can have several Master units producing on your present equipment.

THREE SIZES: Model "C," 1/2 h. p. for 9" to 13"; Model "B," 1/2 or 3/4 h. p. for 13" to 18"; Model "M," 1 or 1 1/2 h. p. for 18" to 72" swing lathes.



END MILLING 2 1/2" KEYWAY IN 9 7/8"
SHAFT 22 FT. LONG

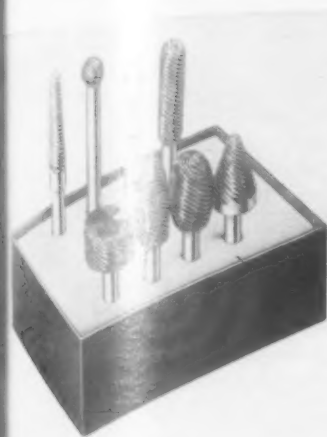


1 1/2 H.P. MODEL "M" ON LATHE MILLING
1/2" KEYWAY 1 FT. PER MINUTE

WRITE FOR TWENTY-FOUR PAGE CATALOG

MASTER MANUFACTURING CO.
1302 EAST AVENUE A ■ HUTCHINSON, KANSAS, U. S. A.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-172

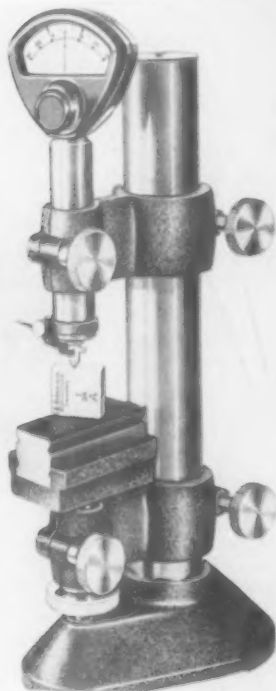


Rotary Files and Burs

Rotary files and burs are high-speed steel tools which are either hand-cut or milled before hardening. They are used for a wide variety of metal-cutting operations in all types of industry. Over 200 sizes and shapes are stocked. The Martindale Electric Co., Cleveland 7. Booth No. 1212.

T-3-1731

Comparator Amplifier



The C. E. Johansson Mikrokator is a comparator amplifying instrument for precision measurement based on a revolutionary principle of frictionless amplification which is 100 percent mechanical. The mechanism has no friction and no bearings or other moving parts subject to wear.

The measuring pressure can be set at any value between minus and plus 2 lb on request. The standard measuring pressure is 18 oz. Made by C. E. Johansson Gage Co., 8900 Alpine Ave., Detroit 4. Booth No. 701.

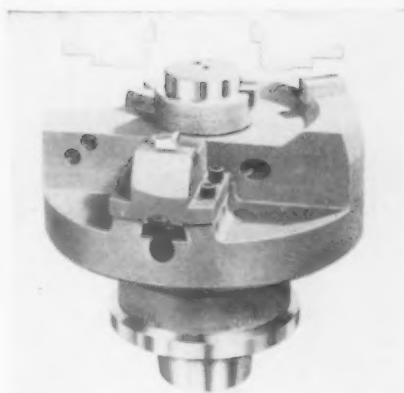
T-3-1732

Cutter Heads

These special cutter heads combine several cutter operations in one tool, thereby assuring perfect concentricity between diameters, and reducing machine set-up time.

The bodies have great rigidity to take heavy feeds and provide solid, positive, independent support to the blades. These blades (high-speed steel, hard alloys, or tungsten-carbide) are designed with correct angle, positive or negative rake, and proper projection from the body. The Gairing Tool Co., Detroit. Booth No. 738.

T-3-1733



3 times the production capacity for the same tool investment

Old timers still tend to gauge a machine tool's productive capacity by its size and mass, and its accuracy by its cost. These old "rules" do not apply today, in the face of advanced machine tool engineering and modern machine tool building methods. For example, a modern TS56B Sheldon Precision Lathe, weighing around 1000 lbs., will handle the great bulk of production lathe work, and it has "Zero Precision" Timken Taper Roller Bearings—more accurate spindle bearings than found in 90% of the lathes of all sizes.

By scientific distribution of metal (rather than sheer mass) these new machine tools have rigidity and stamina not always obtained in more cumbersome machine tools. Lighter, handier and easier to run, they can be safely operated by the less experienced—by whatever operators available.

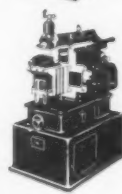
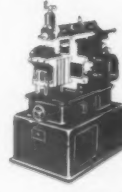
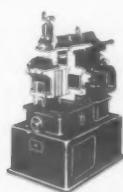
Produced in numbers, in a specially built and tooled plant, Sheldon Precision Machine Tools are low in price. Today for the cost of a single older type tool you can have 2, 3 or even 4 SHELTON units . . . can put 2, 3 or 4 operators to work . . . can double or triple your productive capacity for the same machine tool investment.

Let us show you how.

Write for Catalog

SHELDON

CHICAGO



SEE US AT
BOOTH 1408
ASTE SHOW, CHICAGO

SHELDON MACHINE CO., INC.

4229 N. Knox Avenue, Chicago 41, Illinois

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-173

Heavy Duty Planers

The Hamilton Division of Clearing Machine Corp. is beginning production of a new line of heavy duty double housing planers to be sold under the trade name Martin. Engineering of the new line has been completed and patterns and tooling are well under way according to the company's announcement.

Expanded engineering facilities have been set up in the recently acquired plant in Hamilton, Ohio, and preliminary work is under way on a line of open side planers as well. Other related machine tools may be developed later to broaden the Martin line, the com-

pany said. Clearing Machine Corp., which has its main plant in Chicago, bought the plant in Hamilton in order to obtain additional facilities for producing presses and other items urgently needed for the defense program, but the facilities acquired were somewhat greater than their immediate needs.

T-3-1741

Brazed Carbide Tips

The Eastern Tool Company, East Hartford, Conn., has recently developed a method for brazing carbide tips to dial indicator points, according to recent company announcement. The

manufacturer states its brazing method creates a firm bond between carbide tip and body without building up brazing strain in the carbide. This is said to eliminate the possibility of tip fracture. The hardest practical grade of carbide is used. Evaluation of these tips indicates a long life on consistent accuracy and high resistance to wear when in contact with revolving, cylindrical pieces. The announcement states that the hard carbide gives these tips a high resistance to sudden shock. The manufacturer is ready to furnish points to blueprint, new, or on your bodies.

T-3-1742



1200
CRANKSHAFTS
DRILLED
PER DAY



DRILL LIFE UP
85%

THE automobile industry created and grew with "planned production efficiency". From a large automobile manufacturer, a leader in production efficiency, comes the story showing the reason for an industry-wide switch to ERICKSON precision holding tools.

"... Since installing ERICKSON collet chucks on all machines last year, we have reduced a breakage of 20 drills per day (as high as 40 when forgings were hard) to less than 3 or 4 broken drills a day. The full grip of ERICKSON collet chucks stops drill chatter and whip. Also, they permit the use of longer drills and drill stubbing giving greatly added drill life. The above figures are based on an average of 1200 crankshafts a day.

ONLY ERICKSON PRECISION CHUCKS...

- | | |
|---|--|
| <p>1. Deliver guaranteed accuracy of .0005" T.I.R.</p> <p>2. Grip along entire length of collet.</p> <p>3. Replace 7 standard single-purpose collets.</p> | <p>4. Grip on drill flutes; permit stubbing and use of broken drills.</p> <p>5. Permit use of greater feeds and speeds.</p> <p>6. Prolong tool life.</p> <p>7. Reduce set up time.</p> |
|---|--|

Write for Catalog "J" today

SEE ERICKSON TOOLS DEMONSTRATED
UNDER ACTUAL PRODUCTION CONDITIONS:
BOOTH 1127 ASTE INDUSTRIAL EXPOSITION,
CHICAGO AMPHITHEATRE • MARCH 17 TO 21

ERICKSON TOOLS
DIVISION OF THE ERICKSON STEEL COMPANY
2316E HAMILTON AVE. • CLEVELAND 14, OHIO

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-174

Machine Drills-Taps

The combination drilling and tapping machine has a No. 10A tapping and a No. 10 reaming head, a No. 13 indexing fixture mounted on a special base.

Both heads are arranged for single spindle drilling and tapping or reaming and threading. Standard flanges are provided on the quills to allow the mounting of multiple heads to accommodate as many spindles as might be required for a single workpiece or a variety of workpieces. Drive is obtained through V-belts to a six-speed transmission on the reaming head and through cone-clutches running in oil on the tapping head.

The machine is pneumatically operated and controlled, including the index. Ample coolant and chip space is provided in the base of the machine. The heads can be powered with either three or five horsepower motors depending upon the requirements. Kaufman Mfg. Co., Manitowoc, Wis. Booth No. 1926.

T-3-1743

Tool Holder

An eight-position tool holder designed for use on vertical boring and turning mills has been announced by the Davis Boring Tool Div. of Giddings and Lewis Machine Tool Co., Fond du Lac, Wis.

Requiring only one simple wrench adjustment to change position, the new tool, called the Davis 8-position tool holder, will enable an operator to turn, undercut, bore and chamfer in one set-up. Four tools can be mounted at once, with positive position assured by two index pins. Accuracy is assured by the cast steel body of the holder. One simple wrench adjustment will change the position through 360 degrees in accurately indexed increments of 45 degrees. A center pin locks the complete assembly in rigid alignment and clamps it solidly. Decreased set-up time and a resultant increased production are features of the new tool holder.

T-3-1744

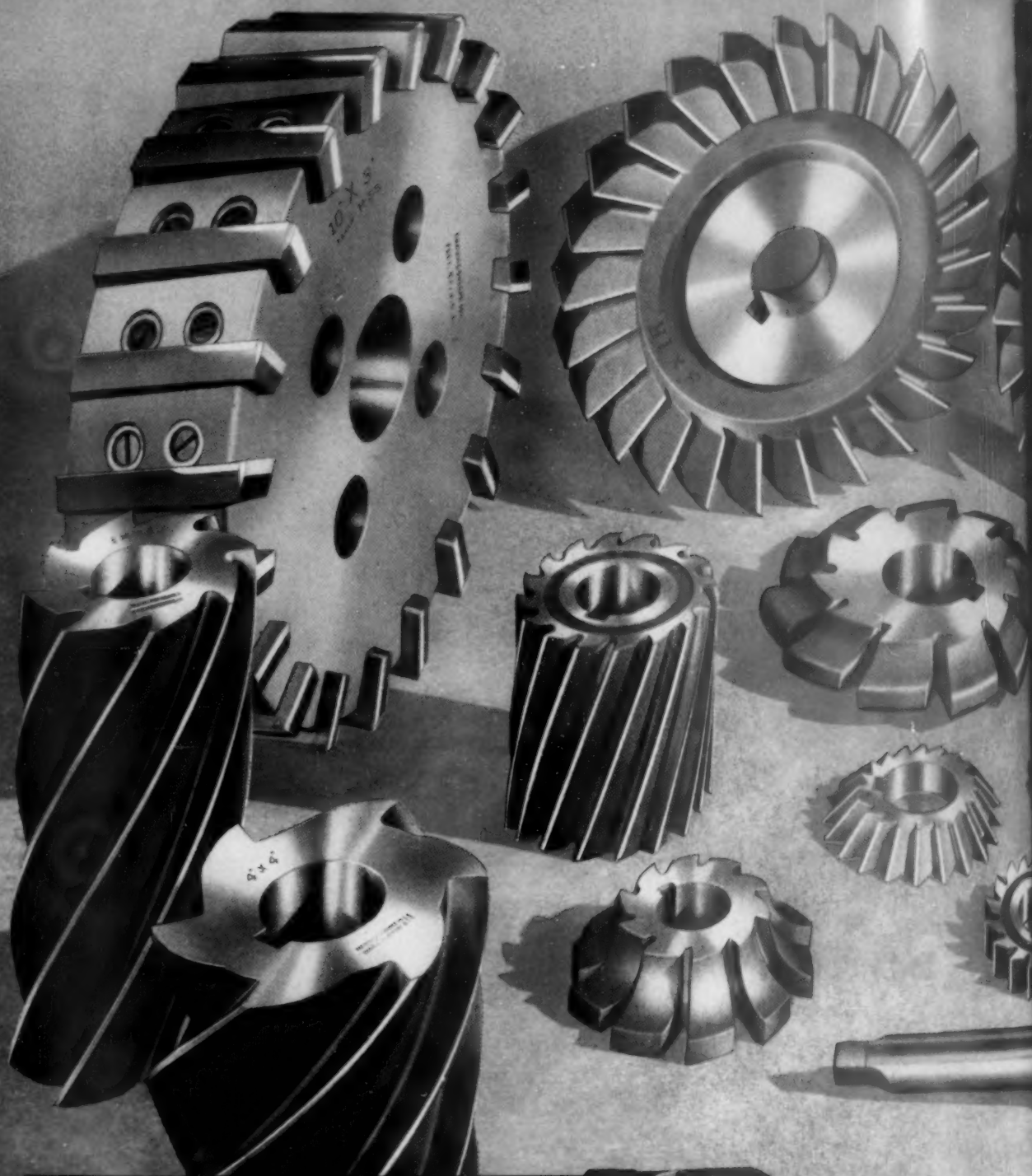
B·S

PRODUCTIONEERED

Cutters for
Maximum Milling Efficiency



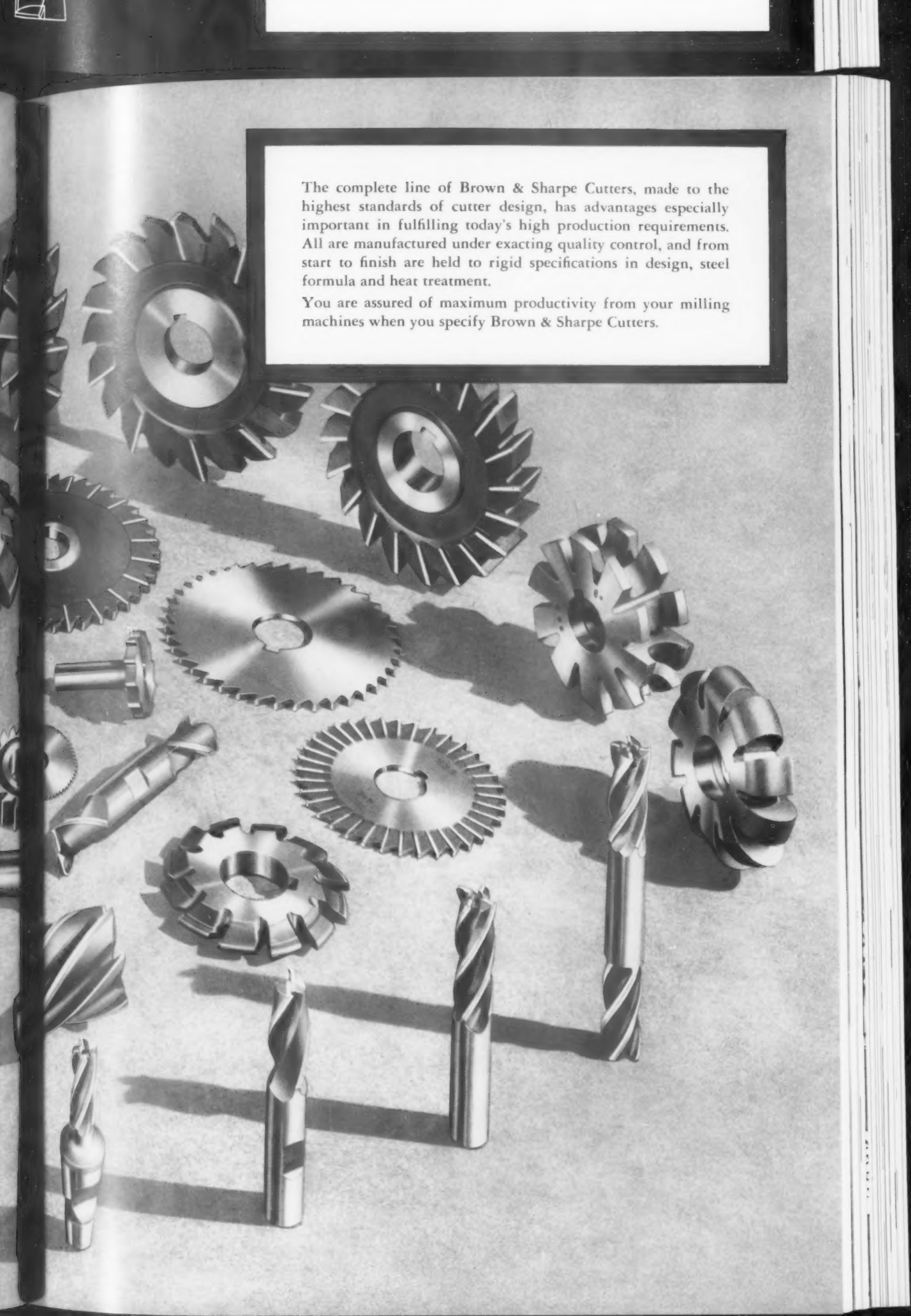
With today's requirements demanding the highest production of accurately milled small parts, it will pay you well to consider Brown & Sharpe Cutters. Brown & Sharpe offers a complete line that permits the selection of exactly the right cutter for each particular job. Every cutter is especially designed for its job — "Productioneered" — to cut faster, more freely, with less power, delivering to you the very maximum of productivity with minimum time-out for sharpenings.



Brown & Sharpe

PRODUCTIONEERED

*for maximum output
... minimum sharpening
... for any job*



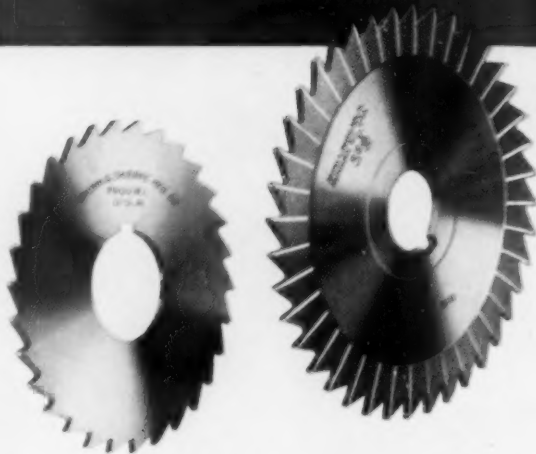
The complete line of Brown & Sharpe Cutters, made to the highest standards of cutter design, has advantages especially important in fulfilling today's high production requirements. All are manufactured under exacting quality control, and from start to finish are held to rigid specifications in design, steel formula and heat treatment.

You are assured of maximum productivity from your milling machines when you specify Brown & Sharpe Cutters.



PRODUCTIONEERED

Cutters for Special Jobs



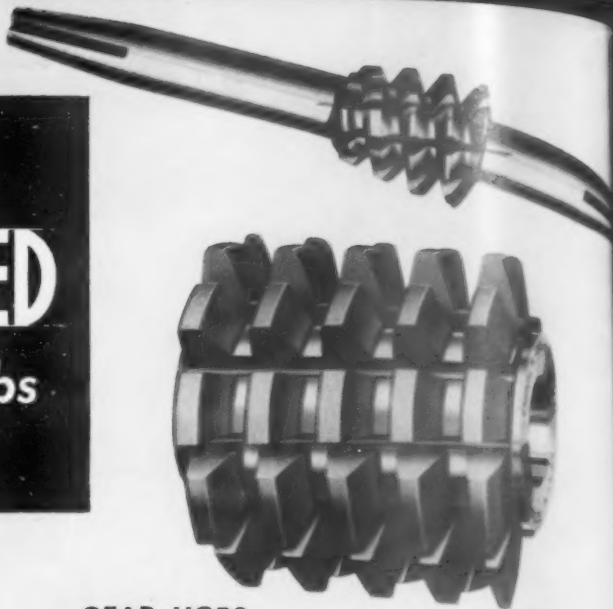
METAL SLITTING SAWS

For deep slots, proper clearance.



SPECIAL CUTTERS

For speed and economy in quantity manufacture of duplicate parts. Custom-made cutters of many types including formed cutters, end mills, carbide cutters.



GEAR HOBS

For fast, clean, gear cutting
— Stub Tooth, Spur, Worm,
Tangential Feed and
Special Hobs.



ROTARY SHEARS

For fast stripping or slitting thin metal,
rubber, leather, paper and similar
materials.

WRITE FOR COMPLETE INFORMATION ON ANY OF
THE BROWN & SHARPE PRODUCTS LISTED BELOW

Brown & Sharpe

Milling Machines • Grinding Machines • Cutters
Screw Machines • Machine Tool Accessories • Pumps
Machinists' Tools • Electronic Measuring Equipment
Johansson Gage Blocks • Permanent Magnet Chucks

Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

WE URGE BUYING THROUGH THE DISTRIBUTOR
PRINTED IN U.S.A.

Cutting Machines

High speed cutting machinery is manufactured by the Stone Machinery Co., Manlius, N. Y. Several different

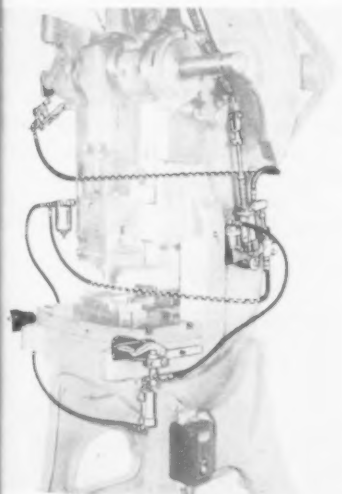


machines are included which use abrasive blades or semi-high speed steel cutting wheels for cutting ferrous and non-ferrous metals at the rate of four seconds per sq. in. Booth No. 447.

T-3-1791

Pneumatic Controls

The Schrader press control is especially designed to operate mechanical clutches and to provide increased power press production through safer and less fatiguing press operation. A special cutout valve in the line connecting the



two operating valves makes it necessary that both hands be used simultaneously for each operation of the press, thereby keeping them away from the danger point at the time the ram comes down.

Information is obtainable from A. Schrader's Son, Div. of Scovill Mfg. Co., Brooklyn 17. Booth No. 433.

T-3-1792



"Can't you think of anything but your new Allison Catalog!"

If abrasive cutting is already a production function in your plant . . . or if you're just considering its possibilities . . . you will want a copy of the NEW Allison Catalog. Information on both wet and dry cutting of various materials . . . information on abrasive cutting machines and their maintenance . . . recommendations for the selection of Allison Abrasive Wheels . . . written by *specialists in abrasive cutting for over 30 years!* Send coupon today . . . your copy will be mailed promptly.



Allison

ABRASIVE CUTTING WHEELS

SEE OUR EXHIBIT AT THE A. S. T. E. INDUSTRIAL EXPOSITION, CHICAGO, BOOTH NO. 1204

THE TOUGHER THE CUTTING JOB . . .
THE BETTER THE OPPORTUNITY FOR

abrasive cutting

THE ALLISON COMPANY

254 Island Brook Ave., Bridgeport 8, Conn.

Gentlemen: Please send me a copy of your new catalog.

Name

Company

St. & No.

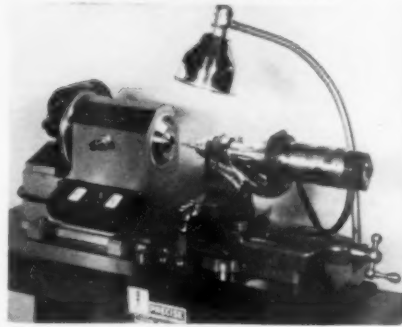
City State

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-179

Adjustable Head Tool

The Eastern Tool Co., East Hartford, Conn., manufactures carbide tipped, adjustable head tools, carbide indicator dial points, and carbide boring tools. The adjustable head tool may be aligned with the center of work in a matter of seconds by making an adjustment on the head of the tool itself. Greater utilization of carbide cutting edge is reported to result from this innovation. Booth No. 102. **T-3-1801**

Grinder-Millers



Small precision-built portable machine tools, these grinder-millers are designed to do production and toolroom work which had not been possible previously except with the use of heavier capital equipment. The machines are adapted for internal grinding and internal taper grinding to tolerances as close as 0.0001 in. or angular tolerances within one minute of arc on internal tapers.

Operating at speeds up to 45,000 rpm and developing up to 1/4 hp, the grinder-millers are manufactured by the Precision Products Co., 1328 Clark St., Racine, Wis. Booth No. 1005.

T-3-1802

Electron Drills



Electron drills, made by the Elox Corp. of Clawson, Mich., are designed for the removal of broken taps and drills, plus being capable of drilling either round or shaped holes in hardest metals. Electron Drills work on the principle of creating a series of intermittent arcs which disintegrate or vaporize metal. No damage is done to either the original threads or the work piece.

All units use 110-V, 60-cycle current. Booth No. 318. **T-3-1803**

Abrasive Wheels



The Bay State Abrasive Products Co., Westboro, Mass., features Saf-T-Cut reinforced disc wheels along with wheels for grinding and sharpening the cemented carbides. Booth No. 409.

T-3-1804

**SEE WESPO EXHIBIT BOOTH 240
A. S. T. E. SHOW CHICAGO, ILL.**

STANDARDIZE

with

WESPO

STANDARD FIXTURE PARTS and FITTINGS



The cut shows a few of the 350 parts and fittings which are used by leading manufacturers to save time and money formerly spent in designing and machining.

WESPO parts are precision manufactured of quality steel—heat treated and rust proofed. They are made for heavy duty and long usage and have proved their value in many industries.

OVER 350 PARTS AVAILABLE

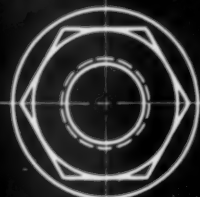
This wide variety of types and sizes makes it easy to use WESPO parts for almost any of your fixture needs. **TEMPLATE DRAWINGS OF ALL PARTS ON REQUEST.** Write for catalog.

WEST POINT MFG. CO.

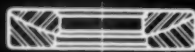
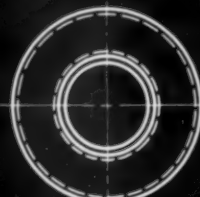
26939 West 7 Mile Road
Detroit 19, Michigan



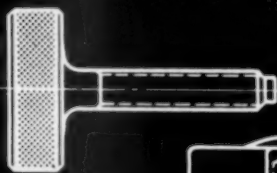
KNOB SHOE ASSEMBLY



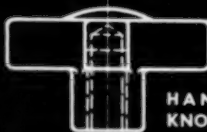
FLANGE NUTS



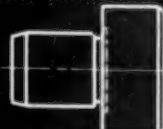
SPHERICAL WASHERS



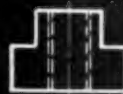
**ADJUSTING
HEAD SCREWS**



**HAND
KNOBS**



REST BUTTONS



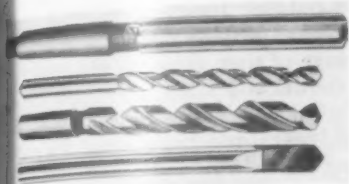
T-SLOT NUTS

**TEMPLATE DRAWINGS
OF ALL PARTS FREE**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-180

Carbide Tools

Super Tool Co. manufactures a complete line of solid carbide and carbide-tipped milling cutters, drills and reamers.



The drills are tipped and solid carbide in regular and fast spiral. Standard tools are now available from stock with Carboloy and Kennametal tips as well as with other recognized makes of carbide.

Information is obtainable from Super Tool Co., 21650 Hoover Road, Detroit, Booth No. 1429. **T-3-1811**

Liquid Honer



Two liquid honing machines made by Vapor Blast Mfg. Co., Milwaukee, are a new small toolroom machine and a larger machine with track and car for handling dies.

Both of these machines have been developed for use in honing tools, broaches, hobs, taps and drills and larger tools such as dies and molds.

Booth Nos. 1210 and 1317. **T-3-1812**

Cylinders

Some of the features built into Miller cylinders include space-saving square solid steel heads and caps, dirt wiper seal, leakproof rod seal that never requires adjustment and automatically compensates for wear. Long stroke cylinders can be manufactured in strokes up to 22 feet in various bore sizes and mounting styles to fit particular applications for air, high pressure hydraulic and low pressure hydraulic service. Miller Motor Co., 2040 N. Hawthorne Ave., Melrose Park, Ill. Booth No. 1731. **T-3-1813**

GARRISON GEAR CHUCKS CUT SCRAP LOSS!



Here's WHY

Built-in accuracy and exclusive, patented fixed multiple location, "average-out" errors of cutting and heat treating.

EVERY GARRISON GEAR CHUCK ALSO FEATURES:

QUICK CHUCKING . . . Garrison gear chucks have increased production as much as 700%.

QUICK SET-UPS . . . Garrison gear chucks are ready for use as soon as they are mounted to a simple face plate or adapter.

SHORT OVERHANG . . . Assures closer limits and better finish.

VERSATILITY . . . Garrison gear chucks are used for any operation after the teeth are cut.

Garrison pitch line control gear chucks are "custom-built" for each gear by specialists who have manufactured gear chucks exclusively for over thirty years. This accumulated gear chuck knowledge pays off for you at final inspection.

To cut scrap loss, eliminate upset schedules and assure consistent, uniform high production day after day . . .

. . . SEND YOUR GEAR PRINTS FOR A QUOTATION!

Garrison
MACHINE WORKS, INC.
DAYTON 4, OHIO

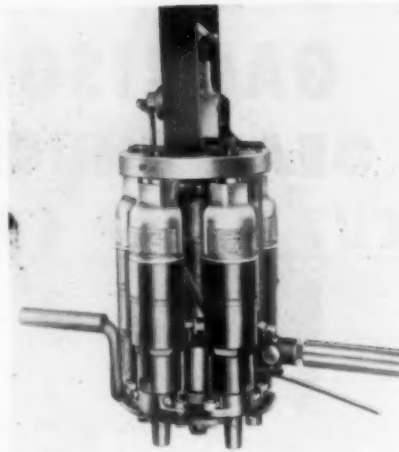
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-181

Multiple Nut Runners

Ingersoll-Rand Co., 11 Broadway, New York, announces multiple nut runners for running two or more nuts simultaneously.

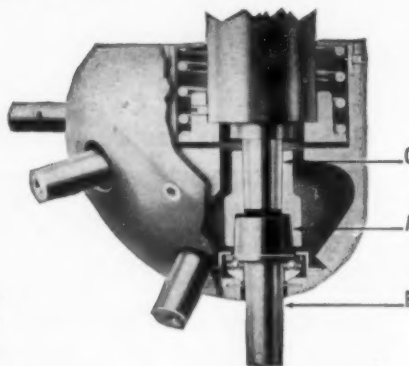
The tools are all supplied with air from a common backhead, and since the air pressure is adjusted so the tools stall at the required torque, all nuts are run to precisely the same degree of tightness. The tools are all mounted in a common fixture, so their individual torques cancel each other out, making the multiple nut runner an extremely easy-to-use tool. Booth No. 1639.

T-3-1821



MORE HOLES PER HOUR — PER DOLLAR

Increase production of any standard drilling machine by adding a Lign-o-matic, the only drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.



FOR ALL CONSECUTIVE DRILL PRESS OPERATIONS

PROVED PRODUCTION INCREASE

Turret indexes faster than tools can be changed or work moved to another spindle. A single Lign-o-matic will release 5 drilling machines for other work and still show increased production and reduced costs on original job.

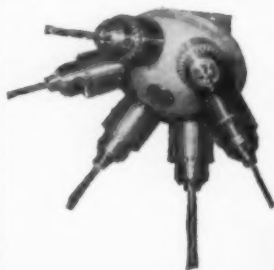
VERSATILITY—Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines), up to 1/2" diameter in any material.

PRECISION—Patented, self-centering tapered drive (A) automatically locks turret spindle (B) into exact alignment with drilling machine spindle (C) for sustained accuracy.

GUARANTEE—May be returned in 10 days for any reason for full refund of purchase price. Two-year guarantee against defective parts.

PRICE—Model D, 6 spindles with No. 2 Jacobs male taper \$235.00
Chucks extra at established prices.

DELIVERY—Currently, 2 weeks.



☐ Please rush Lign-o-matic turrets for (drill press make)..... (size)..... (quill dia.)..... (spindle taper).....

My name.....

Title.....

☐ Please send literature on Lign-o-matic turret. (Attach coupon to company letterhead)

HOWE & FANT, INC.
530 FLAXHILL RD., SO. NORWALK, CONN.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-182

Pumps

Pioneer and Rollway coolant and lubricant pumps, of which there are over 400 models, are used primarily for supplying coolant and lubricant to machine tools. Impeller type pumps, both seal and seal-less models, cover a wide range of sizes, capacities and styles for external and submersible applications.

Seal type pumps include a mechanical seal eliminating the need of a packing gland. This seal consists of a high carbon disc, neoprene washer (impervious to acids and oils) and stainless steel spring.

All Pioneer pumps will permit solids such as chips or abrasives to be carried in the liquid stream without interfering with the mechanical action of the pumps, and Pioneer seal-less type pumps are especially designed for handling fluids highly polluted with abrasives. These pumps have no moving metal-to-metal parts to wear. Pioneer Pump and Mfg. Co., Detroit 3, Booth No. 1528. T-3-1822

Bar Feed Unit



Lipe AML bar feeds are fully automatic magazine-loading pneumatic bar feeds actuated by a pneumatic system of valves and cylinders. The magazine can be loaded with stock bars ranging in number from nineteen 5/8-in. bars to ninety-six 1/8-in. bars, or usually enough for an eight-hour run. The screw machine is started and stopped automatically at the proper times when one piece of stock is exhausted and a fresh one about to be loaded. Lipe-Rollway Corp., Syracuse 1, N. Y. Booth No. 1525. T-3-1823

Short Run Piercing

Wiedemann Machine Co., Philadelphia, have incorporated the latest developments for short run piercing in their machines. These current presses include model R-2 which is bench mounted, model R-41 with drop latch gage table, the RA-41P pantograph turret punch press for high-speed piercing by means of follower templates. Booth No. 1915. T-3-1824

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

From Milne
A COUPLE OF FAST ONES
TO TRY ON YOUR
TOOLING PROBLEMS—

MILNE'S

GRAPHITIC TOOL STEELS

Another Part Of Milne's Complete Line of Solid and Hollow Tool Steels.

ENTIRE LENGTH KOLORKOTED FOR QUICK, SURE, PERMANENT IDENTIFICATION.



GRAPH-TUNG

JIC-WW

Water or Brine Hardening

- ★ Extra High Resistance To Abrasive Wear
- ★ Remarkable Non-Seizing Properties
- ★ Easier Machining Than Other High Wear-Resistance Steels

Kolorkoted Purple & Gray

For deep draw dies, automotive body dies, cold shell-nosing dies, cold heading dies, draw punches, coining dies, lathe centers, blanking dies, blanking punches, cold heading quills, bar and tube draw dies, cold extrusion plungers and other uses.

Manufactured By TIMKEN ROLLER BEARING CO.



GRAPH-MO

JIC-O6

Oil Hardening, Non-deforming

- ★ Faster, Easier Machining Than Standard Oil-Hardening Tool Steels
- ★ Extremely High Wear Resistance
- ★ Non Galling. Does Not Score Or Pick-up

Kolorkoted Pink & Gray

For forming, drawing, sizing, flanging, embossing, and combination dies, work support blades, forming rolls, machine parts, plug, thread and ring gauges, cams, bushings, mandrels, fixtures and other applications.

Manufactured By TIMKEN ROLLER BEARING CO.

Graph-Mo and Graph-Tung are a pair of faster-machining, longer-wearing tool steels that can help you cut tooling costs. In both, diamond-hard carbide particles guarantee super wear-resistance while free graphite insures faster, easier machining and non-seizing properties. Make Kolorkoted Graphitics from Milne standard for your tool room. Write Milne for free bulletins.

Visit us at Booth 120 during the A.S.T.E. Show, Chicago, Mar. 17 thru 21

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745 Washington St.

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17 N. May St.

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Established 1887

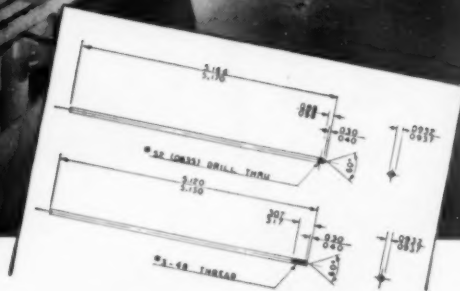
745 WASHINGTON ST., NEW YORK 14, N. Y.

America's Leading Tool Steel Specialists
Complete Line Of Tool Steels—Hollow and Solid

**Holds Limits, Won't Scratch
When Feeding Polished
Needle Bar!**

Technical drawing dimensions and labels:

- Top dimension: 2.16 / 2.10
- Bottom dimension: 2.10 / 2.10
- Label: *SP. LOWS! DRILL THRU
- Right side dimensions: .030 / .040
- Bottom right dimension: .007
- Far right dimension: .0015 / .0017



In a recent letter to Mr. H. L. Burlingame, Screw Machine Foreman at Friden Calculating Machine Co., Inc., San Leandro, Calif., we asked how much had his new Lipe Bar Feed increased production on a B&S #00G. This was his reply:

"To be perfectly frank, when we first installed your air feed attachment, it was not with the idea of increasing production but to find some way to handle polished needle bars in order to hold length and eliminate feed finger scratches.

"In checking our records on parts #80011 and #80011-T (above), we find that originally using feed fingers, we produced approximately 300 pieces an hour. Upon the introduction of your Automatic Magazine Feed, we have stepped this up to approximately 500 pieces an hour.

"The saving to us on feed fingers alone has more than paid for the attachment we have installed."

**Lipe Automatic Magazine
Loading Bar Feed
will . . .**

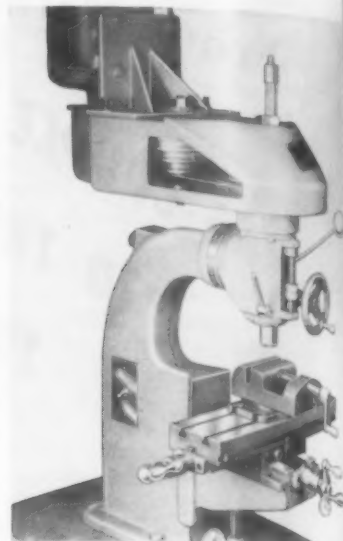
- Feed automatically to the smallest remnant.
- Accurately feed any required distance.
- Handle exact-size polished stock without marring or scratching.
- Reduce scrap loss.
- Eliminates feed finger replacements and repairs.



Manufacturers of Automotive Clutches and Machine Tools
Syracuse 1, N. Y.

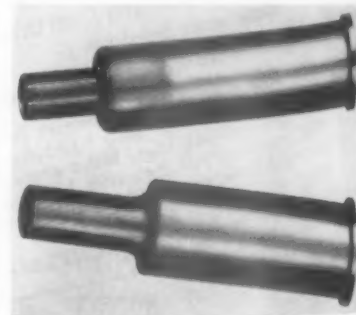
Milling Machine

The No. 2 vertical milling machine made by Columbia Enterprises, Gray Lake, Ill., incorporates all of the features found in previous models and



cludes a number of new ones. The No. 2 model has a quill with a 2-1/2-in. vertical travel with sensitive handwheel control for boring and fast arm traverse motion for drilling. Spindle speeds range from 150 to 1750 rpm. A draw bar type collet has a No. 2 Morse taper. Booth No. 341. **T-3-184**

Pivot punches are custom-made to fit particular engineering requirements in four series. First line punches are high-speed steel, straight-ground parallel to the axis of the punch for easier stripping and longer life.

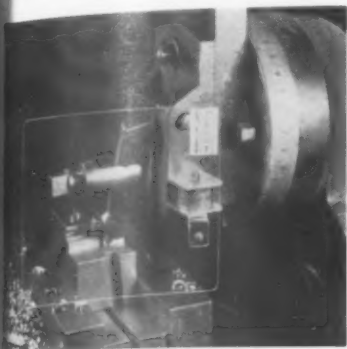


Second line punches are high-speed steel, straight-ground parallel to the axis without the whipsleeve. Third line punches are high-speed steel, cylindrically ground, for non-critical application and/or low production tooling.

Fourth line punches are carbon steel alloy and cylindrically ground. First punch shanks are standard and can be made to fit present retainers. First Punch and Die Corp., 373 Old Niagara Falls Blvd., North Tonawanda, N. Y. Booth No. 343. T-3-18C

Magnetic Grip-Shield

Alnico magnetic parts of the Dilley magnetic grip-shield afford instant magnetic installation on the head of a

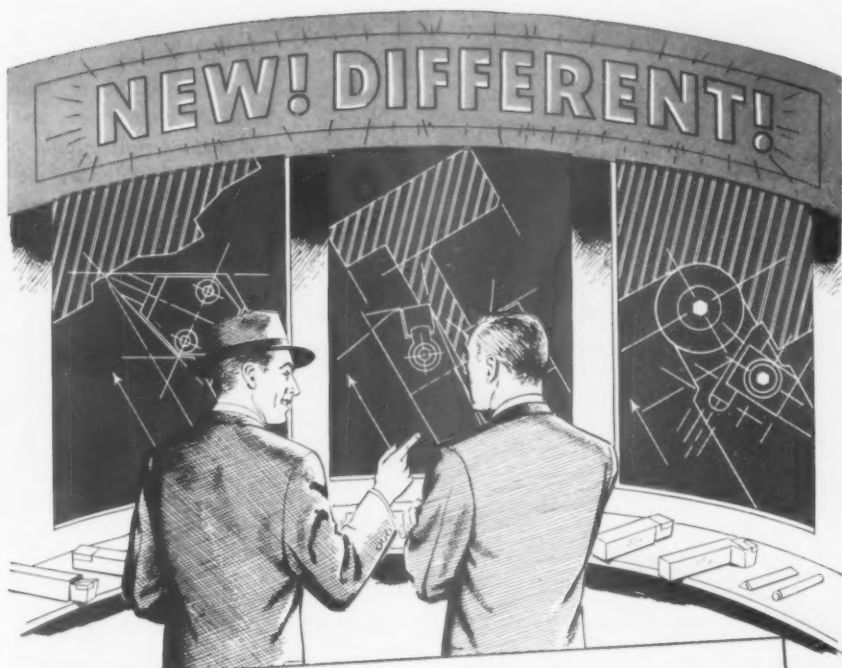


shaper, allowing the protective trusion plastic shield to travel back and forth on each stroke of the shaper. Dilley magnetic grip-shields are instantly attachable to all ferrous surfaces of any machine tool. They have three-way adjustability and grip securely to the point of operation, thereby controlling flying chips. The power of the magnetic base is surprising to those not familiar with this guard. The Dilley Mfg. Co., 1638 Ansel Rd., Cleveland 6, Ohio, Booth No. 243. T-3-1851

Air Line Filter



An air line filter with an automatic drain has been developed by the C. A. Norgren Co., Englewood, Col. Called the Filter-Drain, the device provides automatic removal of liquids and solids from compressed air lines. The filter continues to operate even after the flow of air is cut off, thus assuring the removal of condensate from the air lines when the equipment is shut down. Booth No. 1931. T-3-1852



See How . . .

**KENNAMETAL
TOOL ENGINEERING**

Increases Productivity

At the ASTE show—Kennametal Inc. will demonstrate, with giant-size tool layouts, how to get improved use from your metal-cutting machines, as well as how to reduce tooling costs. Today these factors are of extreme importance as a means to help you offset the effect of inflation.

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MARCH 17-21**



You'll see how good tools, in the hands of skilled operators, can increase productivity on a wide range of metal-cutting operations—trepanning, deep hole drilling, high production runs, heavy duty cutting, tracer jobs, carwheel boring, milling, etc. Don't miss it!



KENNAMETAL Inc.
Latrobe, Pa.

**MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES
AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY**

FOR FURTHER INFORMATION, USE READERS SERVICE CARD; INDICATE A-3-185

Turret Lathe

Among the many features of the Hestika high-speed precision turret lathe, of German make, are high-speed spindles in the turret head, threading attachment, compound cross slide, 18 spindle speeds from 34 to 2400 rpm, and pressure lubricated bearings. The lathe is distributed in this country by de-Castro and Associates, 1515-17 Santa Fe Ave., Los Angeles 21. Booth No. 1904.

T-3-1861

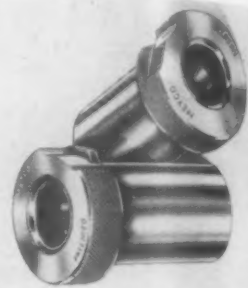
Remote Control

This hydraulic remote control unit is a simplified device for positioning, controlling and duplicating movement at a distance. It has many applications in the product design field including machine tools. Chief among its features is the automatic compensation for contraction and expansion of the fluid media. It operates with a smooth, sensitive stroke. Superdramatic Corp., 14256 Wyoming Ave., Detroit 4. Booth No. 849.

T-3-1862

Drill Jig Bushings

Meyco carbide inserted drill jig bushings are manufactured to ASA standards in headless press fit, head press fit, slip and renewable types of



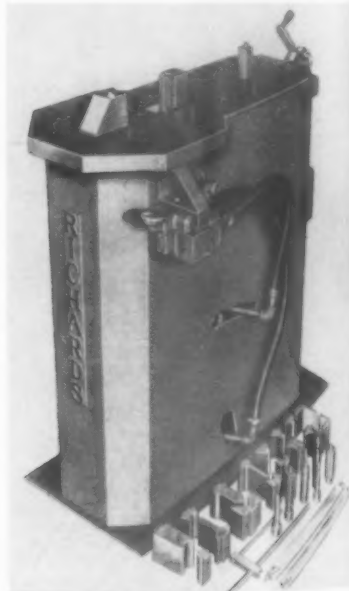
special hardened alloy steel, with tungsten carbide rings inserted at top and bottom at points of wear.

These carbide inserted drill jig bushings combine the best features of steel and carbide to provide the greatest economy in production. The carbide rings resist wear, while the steel rings inserted above each carbide ring protect the carbide. Manufactured by the W. F. Meyers Co., Inc., Bedford, Ind. Booth No. 1826.

T-3-1863

Multiform Bender

This modern multiform bender produces irregularly shaped parts without the cost of special tooling. The unit



operates on 90 psi air pressure which actuates a compound toggle mechanism. It is basically a vertical brake or horizontal press and features quick setup time, low operating cost, fast operation and minimum tooling cost. Made by the J. A. Richards Co., 903 N. Pitcher St., Kalamazoo, Mich. Booth No. 421.

T-3-1864

TUNGSTEN CARBIDE

Specialists



SOLID CARBIDE DRILL BUSHINGS—Fabricated to and interchangeable with A.S.A. standard bushings. Precision ground and lapped to exacting finish and tolerances. Specials on request.



CARBIDE INSERTED COLLETS AND FEED FINGERS—Tungsten Carbide inserted for long life and maximum accuracy with minimum down-time. Your existing worn collets and feed fingers are reworked for top economy.



ROTARY CUTTERS—Replace steel files and mounted points. Can be reground many times for maximum life and cutting efficiency. Available from stock in four diameters and ten standard shapes. Special shapes on request.



END MILLS—Solid Tungsten Carbide for long life and faster cutting. Available from stock in diameters to 1/2". Specials on request. Single End — Double End — Stub Length.

S & E are regularly fabricating from solid Tungsten Carbide, tools that outperform steel *50 to 1.

CUT Down-time—Scrap and Inventory!

INCREASE Production, Accuracy and Profits!



REAMERS—Solid Tungsten Carbide for long life. Precision ground for close tolerances and super finish. Available from stock in diameters to 1/2". Specials on request.

*Based on reports from users

Write Today for free bulletins illustrating these **HIGH PRODUCTION, PROFIT PRODUCING** tungsten carbide tools.

S&E MACHINE PRODUCTS INC.

PLANT AND GENERAL OFFICES: BRIDGEPORT, MICH. • SALES OFFICES IN ALL PRINCIPAL CITIES

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-186

Hardness Tester

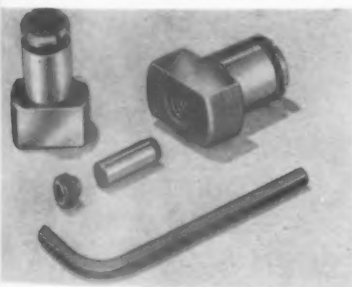
Model KDR direct reading type hydraulically operated Brinell hardness testing machine is a production model



tester designed for hardness testing of large quantities of identical parts. It is the type of machine that meets requirements for quantity production to strict military quality control standards. With Model KDR an operator can test up to 800 pieces per hour on a "go and no go" basis. Steel City Testing Machines, Inc., 8843 Livernois Ave., Detroit 4, Booth No. 611. **T-3-1871**

New Fixture Key

The Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland, Ohio announce the development of a new sine fixture key that eliminates five operations heretofore necessary in milling fixture key slots.



According to the manufacturer, the new sine fixture key saves up to 50 percent of labor costs in laying out and milling fixture base plates. The stemmed construction of the "S" fixture key requires a bored hole in lieu of the standard milled fixture key slot, thereby completely eliminating the need for the usual milling operations and setups. Booth No. 350. **T-3-1872**

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



ALBION MALLEABLE IRON CO.
cuts cold-shearing costs with

FARQUHAR Hydraulic Press

The Albion Malleable Iron Company produces automotive castings at its Albion, Michigan plant. Cold-shearing the gates from the castings in this modern plant requires dependable, trouble-free equipment, and for this equipment Albion turned to Farquhar engineers. After studying the problem, Farquhar recommended a 200-ton self-aligned, gap-type Farquhar Hydraulic Press. This press not only proved completely satisfactory in operation, but was also able to effect substantial economies because it was designed *specifically* for the job in hand.

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in heavy produc-

tion. Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send for Free Catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: A. B. FARQUHAR CO., *Hydraulic Press Division*, 1519 Duke St., York, Pa.

GET THE DETAILS on how our Deferred Payment Plan helps you pay for your Farquhar Hydraulic Press out of the savings it produces!

Farquhar

HYDRAULIC PRESSES

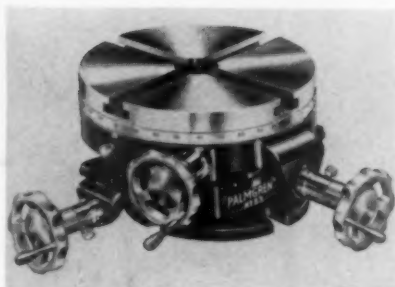
for Bending • Forming • Forcing • Straightening • Assembling • Drawing
Extruding • Joggling • Forging • and other Metal-working Operations

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-187

Rotary Table

A rotary table with full 360-deg rotary movement and 4-in. cross-feed travel was recently announced by the Chicago Tool and Engineering Co., 8383 South Chicago Ave., Chicago 17. Known as the Palmgren No. 83, it has a circular table 8-in. in diameter with a $\frac{5}{8}$ -in. x $1\frac{1}{4}$ -in. "T" slot. The table is precisely graduated for the full 360 deg by single degrees in right-angle segments. A smooth-operating adjusting screw permits accurate setting to any position.

The 4-in. cross-feed movement, which provides a 2-in. travel each way from center, is controlled by another accur-



ately graduated screw that permits infinite adjustment within the travel range. All graduation markings are clearly and permanently cut into the material for easy reading. Booth No. 310. **T-3-1571**

Tool Holder

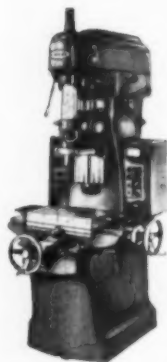
The universal precision tool holder is said to perform the work of ten single purpose tool holders with a maximum of convenience and flexibility. Some of its features are as follows: simplifies and speeds up machining operations; but can be removed for regrinding in any operation without disturbing the setting of the tool holder in the toolpost; precision-made for smoother operation of locking device, which holds bit secure and eliminates chatter and bit breakage; can be used in either right hand, left hand, straight, or any position the operator desires. Round boring bars and threading tools can be used in the same holder. Acme Tool Co., 71 West Broadway, New York 7, Booth No. 128. **T-3-1572**

Tapping Head



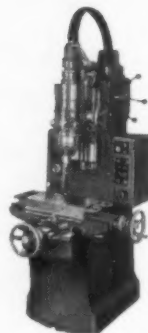
The Proconier tapping head, designed for more accurate, high-speed production tapping, has been providing better service, longer life, faster, more dependable tapping with cleaner, sharper threads and fewer broken taps. Tap breakage is practically eliminated due to the sensitivity of the cork-faced friction clutch which automatically regulates driving pressure. Proconier Safety Chuck Co., 16 South Clinton St., Chicago. Booth No. 1624. **T-3-1573**

NOW IS THE TIME TO PLAN AHEAD



No. 2 MOORE JIG BORER, with its accurate lead screw settings within .0001", offers all the time-proven precision features associated with Moore Jig Borer construction for 15 years, plus numerous labor-saving advantages, including: increased capacity and size; infinitely variable spindle speeds; 3 power feed ratios; centralized controls.

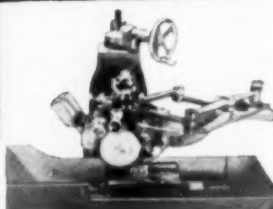
No. 2 MOORE JIG GRINDER. With this new and larger Moore Jig Grinder, regular and irregular contours are ground to size and location after hardening. This extends the Jig Grinder's traditional function of re-locating straight and tapered holes. Holes from $\frac{1}{8}$ " to 8" can be relocated and ground within .0001" by power or hand feed.



Four ways to cut costs and meet competition by mechanizing your toolroom.



No. 1 MOORE JIG BORER remains in the line. For its range-table working surface of 10" by 16" and cuts up to $3\frac{1}{2}$ "—this machine is still an ideal buy. There are over 1000 satisfied users. We will continue to offer it for the many situations where a small, accurate jig borer fills the required prescription.



MOORE PANTO-CRUSH WHEEL DRESSER speeds form-grinding and cuts costs. Both crush-forming and diamond-dressing are accomplished with this 2-in-1 unit permanently mounted on the wheel spindle of a surface grinder. You switch from one method to the other without disturbing workpiece setting.

We'll be glad to send you complete descriptive literature on any of these machines.

MOORE SPECIAL TOOL COMPANY, INC.
732 Union Ave., Bridgeport 7, Connecticut

ADD MOORE TOOLS TO YOUR TOOLROOM

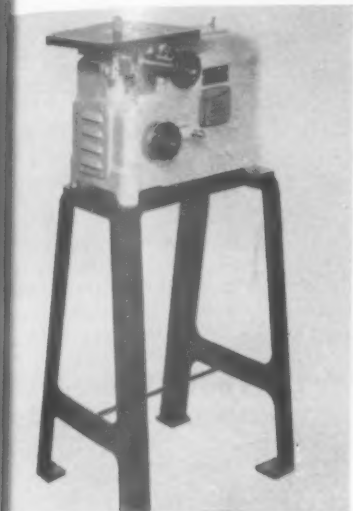
JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-188

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Profile Grinder

The Milwaukee profile grinder is built to perform a wide variety of grinding operations and is especially adapted to the precision grinding of clearances and the sharpening of cutter dies and punches. Special features include a powerful, high-speed



motor; reciprocating spindle mounted in self-aligning bearings; an 11-in. square table that tilts 30 deg to front and 15 deg to side; and a collet chuck that centers and firmly grips grinding wheel shanks. Built-in diamond wheel dresser is always ready for action. Rice Pump and Machine Co., 226 N. Milwaukee St., Grafton, Wis. Booth No. 1214.

T-3-1891

Cutting Tools

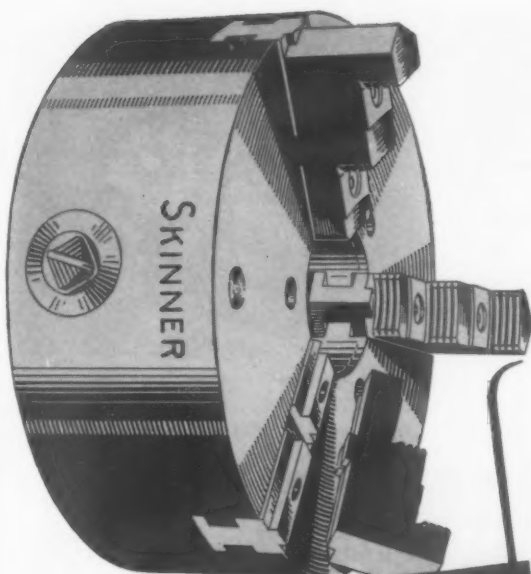
Cutting tools and broaches are manufactured by the Continental Tool Works Division of the Ex-Cell-O Corp. Continental standard tools include hand-



detachable counterbores (available singly and in toolroom sets), inverted spot-facers, core drills, inserted blade face mills and tap drivers. Specials include examples such as multiple thread milling cutters and both circular and flat form tools. Continental broaches are included in the line. The Ex-Cell-O Corp., Detroit. Booth No. 1708.

T-3-1892

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



SKINNER SCROLL CHUCKS

*Sold by
leading
distributors
in every
industrial
area*

Finest engineering, quality materials and latest production techniques are your assurance that nothing can surpass the quality of Skinner Chucks. Whether you are a builder or user of machine tools, you should be sure that none of the basic accuracy of your machines is lost through "second-best" chucking equipment. The Skinner trade-mark denotes "The Crest of Quality," and your nearby Skinner distributor is ready and willing to show you the quality features inherent in the complete Skinner line. Ask him for the Skinner Catalog, or write direct to the company.

HAND & POWER OPERATED MACHINE CHUCKS — AIR CHUCK EQUIPMENT
— FACE PLATE JAWS — MACHINE VISES

SKINNER INDEPENDENT CHUCKS

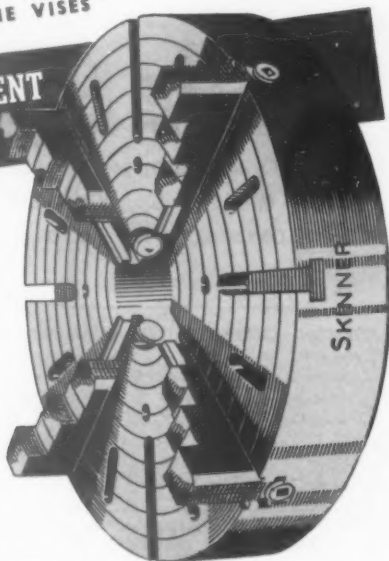


THE CREST OF QUALITY

**THE
SKINNER
CHUCK CO**

354 Church Street, New Britain
Connecticut

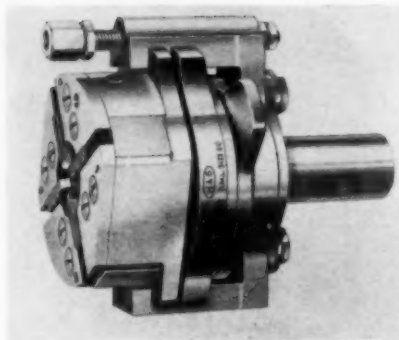
FOR FURTHER INFORMATION, USE READERS SERVICE CARD; INDICATE A-3-189



Die Head

An aligning self-opening die head for Browne & Sharpe automatic screw machines, or any other machine in which the die head does not rotate, such as turret lathes and hand screw machines, has been announced by the Eastern Machine Screw Corp., New Haven, Conn. The company also makes a full line of die heads including the receding type for cutting pipe threads. Booth No. 1435.

T-3-1901



GIVES YOU 5 OUTSTANDING ADVANTAGES

for Deburring, Descaling and Finishing Operations



1. Eliminates tedious hand filing, scraping, polishing, deburring, etc. to save many man hours.
2. Provides absolute uniformity in quantity lots.
3. Maintains exacting tolerances on precision parts where no dimensional change is allowable.
4. Imparts a finish mechanically that was formerly considered possible only by hand methods.
5. Low initial cost—requires minimum maintenance. No exhaust systems required.

Send samples for free demonstration


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Avail yourself of the unusual engineering skill and ability which is found at the Roto-Finish Company.

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Roto-Finish Engineers make periodic visits to your plant to supervise and demonstrate the use of Roto-Finish processes, to train your operators, and to offer helpful suggestions to improve your products wherever possible.

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ROTO-FINISH GUARANTEES RESULTS

HERE'S THE WAY IT WORKS

You buy nothing until analysis proves results will benefit you.

LABORATORY ANALYSIS

Your products are analyzed to determine which combination of equipment and materials will do the best job for you at the lowest cost... before you make any investment.

RESULTS GUARANTEED

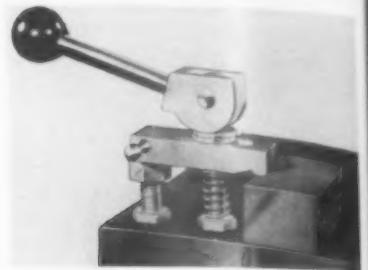
We guarantee to reproduce the same results in your plant that we have produced on your samples processed in our laboratory.

A COMBINATION OF MATERIALS AND MACHINES

When you buy, you get machines and materials that are properly combined for your job.

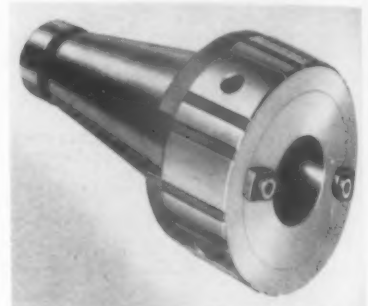
Fixture Clamp

This quick-action clamp, produced by the West Point Mfg. Co., 26935 W. 7 Mile Road, Detroit 19, is designed for holding workpieces. Clamp is rust-proofed and has ground spherical washers, allowing them to compensate for any irregularities in the work.



The clamp is available in five sizes with either plastic ball knob or solid steel handle. Booth No. 240. T-3-1902

Tool Holder



The Beaver quick-change tool holder is one of the many models of rigid, accurate, fast-action tool holders manufactured by Beaver Tool & Engineering Corp., Royal Oak, Mich., for all types of milling, drilling and boring machines.

When using Beaver quick-change holders and adapters, tools can be pre-set to the job and will repeat accurately and automatically for both radial and end-wise positioning when changing from one tool to another. Booth No. 1219.

T-3-1903

Tapper



The Wickman tapper is an attachment for reversible machines to provide tap protection on blind and through holes. One of the new features is a detachable taper shank holder with quick change lock for tapper or drill adapter. Change-over from tapping to drilling, counterboring, reaming, etc., is made in a few seconds. Wickman Mfg. Co., 15533 Woodrow Wilson Ave., Detroit 3. Booth No. 1105.

T-3-1904

The Tool Engineer

Turret Lathe

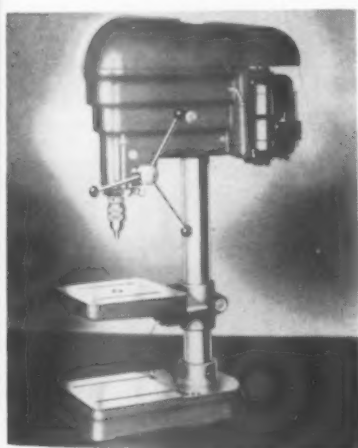
A turret lathe and a second operation lathe made by Franz Kuhlmann, Wilhelmshaven, Germany, is being introduced by Eric R. Bachmann, 27-41st Ave., Long Island City, N.Y., exclusive U.S. representative.



The machines are designed according to modern practice for accurate production work and feature a totally enclosed welded steel machine base in which the motor, coolant pump, jack shaft, coolant tank, electrical controls, fuses and a reversing switch are located. The motor is a two-speed reversible type which, in connection with the various V-belt pulleys, allows 12 different spindle speeds up to 6000 rpm in forward and reverse. Booth No. 1817.

T-3-1911

Drill Presses



Boice Crane Co., 930 W. Central Ave., Toledo, Ohio, make two lines of drill presses, one with 5/8-in. capacity and the other 15-in. with 1/2-in. capacity. Both lines are made up of power operated single and multiple spindle drilling and tapping units. There are more than 100 model options, varying as to floor or bench types, high and slow speed, spindle types, and work arbors. The company also manufactures band-saws. Booth No. 136.

T-3-1912

Coolant Separator

The Barnesdril magnetic coolant separator insures consistently clean coolant by the constant and automatic removal of harmful metallic and abrasive particles from the coolant as it is used on cutting and grinding operations.

The used coolant from the machining operation is directed through a concentrated permanent magnetic field 27 1/2 in. in length with specific width and depth according to the requirements of the coolant condition. Removal of the metallic load promotes freer cutting wheels, longer wheel and



tool life. Barnes Drill Co., Rockford, Ill. Booth No. 1808.

T-3-1913



Gosh, I Wonder
WHEN
We'll Get that
Special Machine?

Why wait? Perhaps the Job Can be Done on a Standard Machine with Kemp Smith Attachments

You know — it's really surprising how many difficult milling operations can easily be handled by Kemp Smith Standard Attachments mounted on a standard milling machine.

Manufacturers faced with urgent production schedules are utilizing Kemp Smith Standard Attachments to help solve their milling problems. These precision-built accessories are made to perform the most delicate milling operations, with speed and accuracy. They frequently eliminate the need for special, single-purpose machines, at the same time reducing production costs to rock bottom.

Look to Kemp Smith for milling machines, attachments, arbors and accessories. They are backed by more than 60 years specialized experience in this field.

Write for bulletins describing Kemp Smith Standard Attachments, Arbors and Accessories.



KEMPSMITH MACHINE CO., 1847 S. 71st St., Milwaukee 14, Wis., U. S. A.

KEMPSMITH

Precision Built Milling Machines Since 1888

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-191

Power Shears

A variety of machines to cut and form light gage sheet metal is made by Niagara Machine and Tool Works, Buffalo 11, N. Y. Among them are several squaring shears, one powered by foot, one by air and one by electric motor. There is also an air-actuated bar folder, a multi-drive power table for rotary operations, a high speed circle shear, a universal rotary machine arranged for flanging, a slip roll former and hand tools. Booth No. 1313.

T-3-1921

Carbide Tool Grinder

The Hammond 14-in. carbide tool grinder is designed for the grinding of tools with a 1-in. shank and larger, and is especially recommended where large numbers of tools with shanks from $\frac{3}{4}$ -in. square and up must be accommodated.

The 14-in. carbide tool grinder is available in two wet or dry models, model 14-WD for two cup wheels, and model 14-SWD for one straight and one cup wheel. Both wet and dry models feature patented safety cup discs which

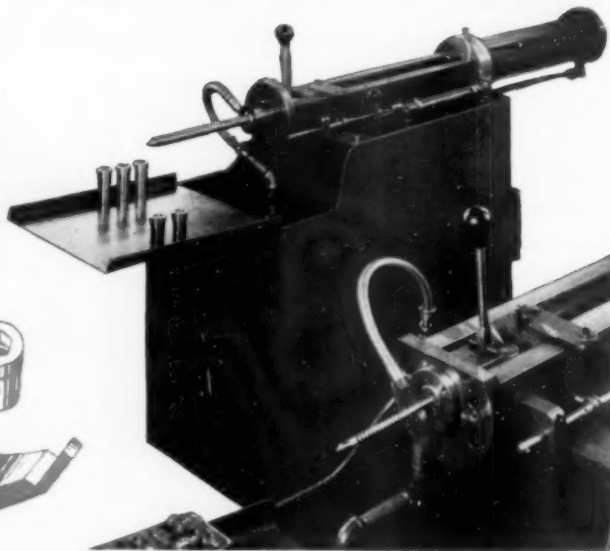


prevent the dropping of tools in the cup of the cup wheel.

A compound protractor tool gage, wheel dresser holder without diamond, and totally enclosed fan-cooled motor are standard equipment. Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo, Mich. Booth No. 1628.

T-3-1922

MAYBE YOU COULD DO IT **BETTER**
BY **Zagar-Broaching**
SPEEDY-ACCURATE-FOR LESS



20" Zagar horizontal broaching machine

See whether the broaching method won't net you a far higher usable output at a far lower cost. The Zagar 20" and 36" machines are inexpensive, fast, easy (for women) to operate, compact and versatile. Inspection is minimized. Let the Zagar Engineering Department recommend the right machine and design the tools to fit machine and job.

Write for
Engineering
Manual E-3.



Zagar

TOOLS FOR INDUSTRY
and SPECIAL MACHINERY

ZAGAR TOOL, INC.
24000 LAKELAND BLVD.
CLEVELAND 23, OHIO

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-192

Automatic Filter

Delpark industrial filters use an automatic process which is new in the industrial filtering field. It is a continuous, self cleaning gravity filter. It filters solids from liquids that will flow, by gravity, through filter material and discharges the solids, in a relatively dry state, into an outside container.

The filter material fed from a roll, rests on, and conforms to, a flat endless conveyor and an inclined discharge ramp provides for the removal of filtered solids. Industrial Filtration Co., Lebanon, Ind. Booth No. 1230.

T-3-1923

Cylindrical Shapes

Finished machined cylindrical shapes are made exclusively from centrifugal



castings of brass, bronze, stainless steel, alloy iron, Ni-resist and Monel metals by the Janney Cylinder Co., Holmesburg, Philadelphia 36. The shapes are for use as pump liners, compressor liners, diesel engine liners, valve seat rings, shaft sleeves, jet engine parts and bearing cages. Booth No. 324.

T-3-1924

The Tool Engineer

Drafting Tables

Mayline drafting tables offer a complete range of styles, combinations and sizes. The tables are modern in design and possess a high quality in materials

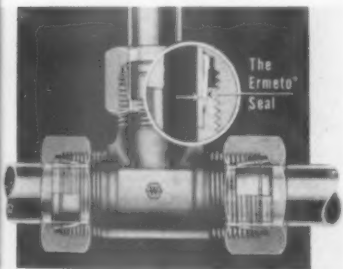


and workmanship. All tables are equipped with a solid basswood top with steel and cleats. The bases and drawer units which can be attached to the table are of hardwood in a golden oak finish. Engineering Manufacturing Co., Sheboygan, Wis. Booth No. 125.

T-3-1931

Ermeto Fittings

Weatherhead Ermeto fittings are practical for use in systems subject to shock loads, severe vibration, impulse and high pressures.



The fitting consists of a body, nut and sleeve and requires no flaring, no threading, no welding and no soldering for a tight, positive seal. Installation can be made with standard tools and without special tube preparation. Made by The Weatherhead Co., 300 East 131st St., Cleveland 8, Ohio. Booth No. 851.

T-3-1932

Vanadium Alloys

The Vanadium-Alloys Steel Co., Latrobe, Pa., are manufacturers of first quality high-speed, carbon and alloy tool steels, from which a large assortment of dies and cutting tools are made. A record of their performance in service compared to that of competing grades of tool steels is available. Booth No. 536.

T-3-1933

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

This **NEW** Catalog Talks your language



NEWCOMER

NP

CONTROLLED QUALITY

CARBIDE

CARBIDE

Write for it Today...

- ★ STANDARD BLANKS
- ★ STANDARD TOOLS
- ★ ADJUSTABLE CLAMP TOOLS
- ★ CARBIDE MILLING DATA
- ★ TECHNICAL DATA

This new catalog contains "up to the minute" prices, tool and blank specifications and other factual data. Prepared and written by men who "talk your language." . . . For real "Controlled Quality," insist upon Newcomer Cemented Carbide.

Newcomer specialists are available anytime, anywhere to work with you.

NP

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General Sales Offices

PITTSBURGH 21, PENNA.

Plants at LATROBE, PENNA.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-193

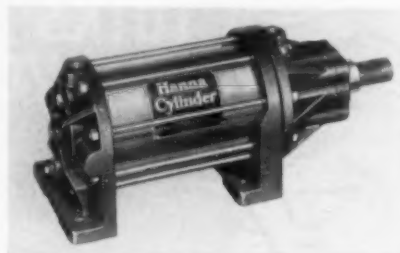
Fasteners

Elastic stop nuts and Rollpins are manufactured by the Elastic Stop Nut Corp., of America, 2330 Vauxhall Road, Union, N. J. The Rollpin is a pressed fit spring type pinning device which eliminates the reaming and peening operations necessary with other pin fasteners. It provides a snug, vibration-proof fastening in normal production drilling holes.

The elastic stop nut is a threaded vibration-proof fastener with a self-contained locking insert of fiber or nylon. It is made in over 3000 types or sizes. Booth No. 217. **T-3-1941**

LP Cylinder

Model 4M is one of a complete line of low pressure cylinders which operate by air, oil or water made by the Hanna Engineering Works, Chicago. Among the features of these cylinders



are: a cork floater ring which facilitates cushion alignment with the head and insures a seal during cushioning; spring-backed chevron rod packings which are self-adjusting for constantly correct compression; and the flange design which permits removal of the front head without disturbing the mounting.

These cylinders are designed for operation up to 110 psi, and with minor modifications, for higher pressures. Booth No. 1625. **T-3-1942**

Micro-Limit Switches

The type ML micro-limit line of heavy duty precision switches offers design and maintenance engineers three limit switches which combine ruggedness with precision operation throughout a long, trouble-free life.

The wide range of field adjustability of their actuators makes these switches



especially adaptable to all types of machinery and industrial equipment.

They have a rugged sealed enclosure and meet NEMA standards. They have an electrical rating as well as a pilot duty rating. Minneapolis-Honeywell Regulator Co., Freeport, Ill. Booth No. 416. **T-3-1943**

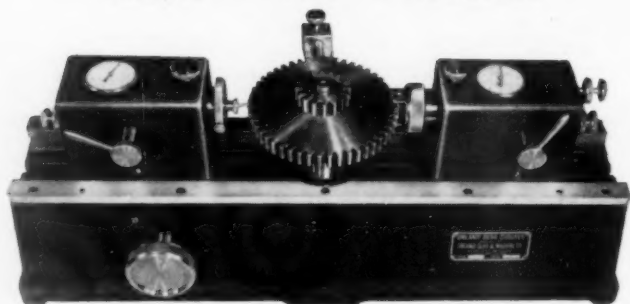
Steel Furnace

The Sentry Co. of Foxboro, Mass., manufacturers of electric metal heat-treating furnaces, announce a model Y high-speed steel hardening furnace which uses the diamond block method of atmospheric control for the hardening of the molybdenum types of high-speed steels. Booth No. 1930.

T-3-1944

ORLANDI Gear Checker

Simple • Fast • Accurate



MAKES GEAR CHECKING SO FAST AND INEXPENSIVE YOU CAN USE IT AT EVERY PRODUCTION STAGE, BLANK TO FINAL, AND REDUCE THE COST OF SCRAP!

CHECKS P. D. (with pins or balls) of spur, helical and worm gears . . . **CHECKS** concentricity (no master req'd) of spur, helical (R. or L.) and worm gears . . . **CHECKS** parallelism of spur gears . . . **CHECKS** helix angles . . . **CHECKS** tooth spacing, tooth to tooth or 180° . . . **CHECKS** concentricity of gears also with masters as a rolling fixture . . . **CHECKS** backlash with mating gears with rolling fixture attachment or pins . . . **CHECKS** P. D. of any thread form with 3 wires.

ORLANDI GEAR & MACHINE CO.

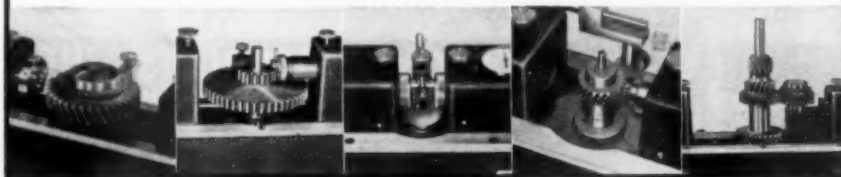
Manufacturers of fine pitch precision gears
16195 Meyers Rd. • Detroit 35, Mich.

Condensed list of users
Addressograph-Multigraph
Borg-Warner Corp.
Caterpillar Tractor
Chrysler Corporation
Ford Motor Co.
General Motors Corp.
International Harvester
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U. S. Slicing Machine Co.
U. S. Arsenal
Westinghouse Electric

3 MODELS:

0"-6" P.D. . . . \$1175
0"-10" P.D. . . . \$1550
0"-15" P.D. . . . \$1965

Attachments Extra
Larger models on special order.



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-194

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OW HE KNOWS IT'S RIGHT. "He" could be a final or process inspector, a foreman or a tapping machine operator — anyone at any point on the production line.

But he could also know when all is **not** well. This gage could warn of a dull tap, a drill going wrong, misalignment in a set up. All these and other faults can be detected by proper gaging.

Now that it's right. Prevent waste. Use good gages!

GREENFIELD TAP and DIE CORPORATION
GREENFIELD, MASSACHUSETTS

KD and CK

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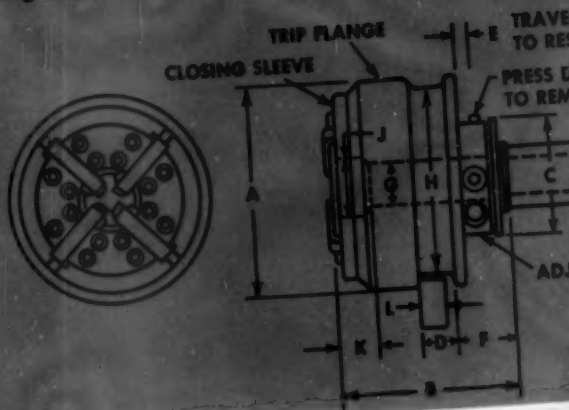
AUST.

TIONS STYLE

B	C	D	E	F	K
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Standard Shapes				Maximum Shank Width Boring
Disc	Lath.	Bore		Dis. Lath.

Tools Yoke Thickness



SPECIFICATIONS STYLE

[illegible]

1 1/4" KD for 1 3/4" Gridley M. S. A.
1 1/2" KD for 2 1/4" or 2 5/8" Gridley M. S. A.

SPECIFICATIONS STYLE CK DIE HEADS

SPECIFICATIONS STYLE CK DIE HEADS											
CK 1	3/16-1	2 1/4	12	None	Cekab	3 3/16	2 3/8	2 3/16	1/2	1/4	1 1/16
CK 1 1/4	1 1/16-1 3/4	2 1/4	12	None	Cekad	4 3/8	3	3 1/4	1/2	1/4	1 1/8
CK 2 1/4	1 1/2-2 1/4	2 3/8	12	None	Cekaf	5 1/8	3 3/8	3 3/4	1/2	1/4	1 1/4
CK 2 3/4	2-2 3/4	2 1/2	12	None	Cekal	5 3/8	3 1/4	4 1/4	3/8	1/4	1 3/16
CK 3 3/4	2 1/4-3 1/4	2 3/8	12	None	Cekam	6 1/8	3 3/8	4 3/4	3/8	1/4	1 3/8

3 3/8	4 1/4	5/8	3/4	1 1/2	2 1/2
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*Length that can be cut when Shank is solid.

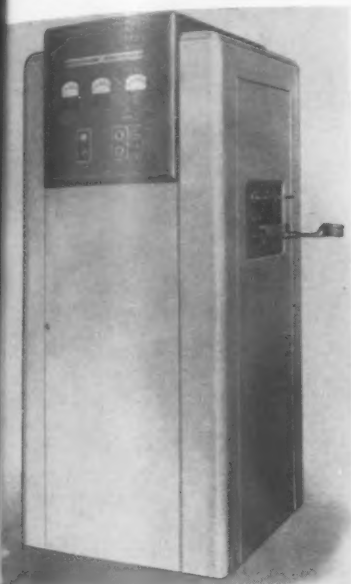
Standard K Chasers used in K1 Die Heads

GEOMETRIC TOOL COMPANY DIVISION
Greenfield Tap and Die Corporation
NEW HAVEN 15, CONNECTICUT

Induction Heater

Allis-Chalmers announces a standard manually-operated 10-kw induction heater used to braze tool tips.

Brazing tool tips is just one example, however, of the use of induction heat, for it has been applied successfully to



thousands of hardening, brazing, annealing and soldering operations. Without exception, in those particular operations, manufacturing costs have been cut or a better product has been obtained.

The company also makes other heater units with outputs from one to 100 kw in various sizes. Allis-Chalmers Mfg. Co., Milwaukee 1. Booth Nos. 1728 and 1730.

T-3-1971

Plating Unit

Model A-50 Chromaster is the latest addition to Ward Leonard's new line of industrial hard chrome plating units. Designed for toolcrib use, the Model A-50 Chromaster is a compact, bench-

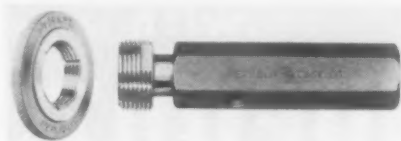


mounted unit for industrial chrome plating metal surfaces up to 25 sq. in. Cabinet measuring only 14 x 32 x 19 in. includes a selenium rectifier power supply, rectangular plating tank and instrument panel. Operates on single-phase, 110-120-volt 60-cycle a-c. Industrial Chrome Div., Ward Leonard Electric Co., Mount Vernon, N. Y. Booth No. 139.

T-3-1972

Gages

Republic Gage Co., 2228 Fenkell Ave., Detroit 21, makes standard thread and plain gages along with special gages.



Precision features include convoluting and chip grooving of thread plug gages, major diameter relief of thread ring gages; accuracy and finish of plain cylindrical plug and ring gages. Booth No. 519.

T-3-1973

Carbide Tools

Adamas Carbide Corp., 1000 S. Fourth St., Harrison, N. J., manufactures a complete line of tungsten carbide tool tips, dies, and wear parts. Standard tool tips include standard single point tool tips, reamer blanks, wear strips, bushings and gage bushings. Solid carbide inserts available are finish ground, ready for use in insert type tools. Booth No. 1301.

T-3-1974

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

ULTRA PRECISION... and as much as 10% longer wear!

A·B·C
DRILL JIG
BUSHINGS

In the manufacture of A·B·C Bushings, we use only electric furnace steel alloy containing chromium and/or tungsten.

This has been our policy since the inception of the business, so there is no backlog of inferior stock or blanks to be used up • Heat Treatment, including quenching, is done under neutral atmosphere conditions controlled by electronic and completely automatic time clock supervision • Recording Instruments show entire heat treatment cycle, including both hardening and tempering temperatures • Latest methods of inspection, including air gauging, coupled with the most modern types of honing and grinding equipment, insure dimensional accuracy • Thus top quality steel, correct for its purpose, the last word in processing equipment and fine care exercised at each step of processing, team up to make A·B·C Bushings

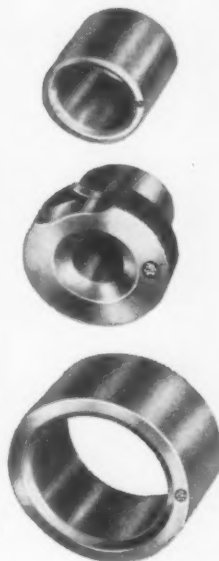
**UNEXCELLED FOR ACCURACY,
CONCENTRICITY AND LONG SERVICE**

Write for catalog, price list and other information needed by the tool engineer.

A·S·A
STANDARD

**A·B·C DRILL JIG
BUSHINGS INCLUDE**

Headless Press Fit • Slip Renewable
Fixed Renewable • Head Press Fit
Also Headless Liners • Locating Jigs
Lockscrews • Clamps



ACCURATE BUSHING COMPANY

Main Office and Factory • 443 North Avenue, Garwood, New Jersey • WEStfield 2-8400
Also Engineering Offices and Regional Warehouse • 5723 W. Chicago Ave., Chicago 51, Ill. • ESterbrook 8-7180

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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-197

GET BETTER CARBIDE TOOL SERVICE with



WENDT-SONIS

NATIONWIDE NETWORK OF DISTRIBUTORS

No matter where you're located there's a Wendt-Sonis distributor within helping distance. W-S carefully selects distributors who know industry, production and carbide cutting tools. You can depend on your W-S distributor!

WIDEST SELECTION OF STANDARD TOOLS

Wendt-Sonis offers only the best from which to choose. Select the right tool for the job from the W-S family of more than 1,000 standard carbide cutting tools. W-S offers extra economies, faster tool delivery when you rely on carbide grade equivalents.



MORE "AIDS" TO PRODUCTION

Wendt-Sonis is known throughout industry as an outstanding source for important production aids. Currently available on request: Chip Breaker Chart, Reaming Instruction Chart, Carbide Grade Recommendation Chart, Feed and Speed Calculator, Decimal Equivalent Chart. Ask your W-S distributor to show you the complete line of carbide cutting tools from 72-page W-S catalog, or write WENDT-SONIS COMPANY, HANNIBAL, MISSOURI for complimentary copy.



WENDT SONIS

CARBIDE CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS
DRILLS • END MILLS • BURS • TOOL BITS • SOLID CARBIDE TOOLS • REAMERS
ROLLER TURNING TOOLS • THREADING TOOLS • SPECIAL TOOLS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-198

Hydroscales

Hydroscales in standard models, kilogram dial models for export, tilt face models for high level reading plus accessories are made by Hydroway Scales, Inc., 20624 West Eight Mile Road, Detroit 19.



Advantages include elimination of handling by weighing loads as they are lifted to be moved, elimination of weighing stations where man power and equipment tie-ups occur and closer checking at receiving and shipping. Booth No. 108.

T-3-1981



Tool Grinders

A new series of universal tool and cutter grinders has been introduced by the K. O. Lee Co., Aberdeen, S. D.

The Lee grinders have improved accuracy standards, greater capacities, 25 percent heavier construction, improved lubrication systems, giving longer life, and many refinements for easy operation. New engineering features simplify and minimize time expenditures in making setups for almost every operation. Booth No. 347.

T-3-1982

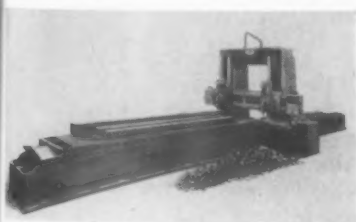
Balancing Machine



With the Micro-Poise static precision balancing machine, correction is applied by drilling out the unbalance while the part is on the machine. Limit on unbalance is held to 0.2 ounce-inches. Angular location and amount of unbalance is determined within six seconds after release of the operating lever.

One of 15 standard models can usually be calibrated and adapted for any production part, permitting custom machine application at standard machine economy. Welding and milling attachments as well as drill units are mounted on the balancer as indicated by the type of correction needed. Micro-Poise Engineering & Sales Co., 14851 Grand River, Detroit 27. Booth No. 818.

T-3-1991



Double Housing Planer

This planer has automatic feeds in all directions, rapid traverse in all directions and power elevation. It is made by one of France's largest and oldest manufacturers of precision machine tools, is built to American standards and specifications, and is American calibrated.

The size range of model 12R is from 51 in. x 47 in. x 13 ft 1 in. to 26 ft 2 in. The size of model 15R is 61 in. x 58 in. x 13 ft 1 in. to 26 ft 2 in. Perrish Steel Products, Inc., 1206 South Maple Ave., Los Angeles 15. Booth No. 1034.

T-3-1992

Drill Chucks

Fully automatic drill chucks made by the Wahlstrom Tool Div., American Machine and Foundry Co., 511 Fifth Ave., N. Y. 17, include three models. Model A holds the smallest size of numbered straight shank drills.

Model B is designed for straight shank drills, and can also be used for tapping by grinding three flats on the top shank. Model C is for use with tools with taper shank, and holds tools with or without tangs. Booth No. 1131.

T-3-1993



PRECISION

At Circle R, all production is measured against our own special standards of precision. Microscopic tolerances are so typical of our work that customers have learned to take the fineness of our product for granted.

Precision in every operation behind the scenes has won for our circular metal cutting tools a reputation unexcelled anywhere. We offer them as the most efficient and economical circular cutting tools you can buy.

METAL SLITTING SAWS
SCREW SLOTTING SAWS
COPPER SLITTING SAWS
COMMUTATOR SLOTTING SAWS
JEWELER'S SLOTTING SAWS
TUBE CUT-OFF SAWS
SLITTING DISCS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS, COUNTERSINKS & CENTER REAMERS

CIRCULAR TOOL CO., INC.
PROVIDENCE 5, RHODE ISLAND
 Chicago • Cleveland • Dayton • Detroit • Burbank
 Milwaukee • New York City • Indianapolis • Pittsburgh
 Philadelphia • Phoenix • Providence • Rochester • St. Louis

*See Them in Booth No. 634
 A. S. T. E. Show, March 17-21, Chicago*

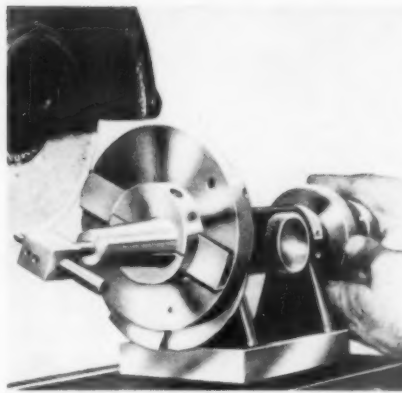
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-199

Wheel Dresser

The Last Word wheel dresser is a rugged, timesaving fixture offering simplicity in setting and adjusting, and can be used for accurate precision wheel dressing with any two angles tangent to a radius, concave or convex.

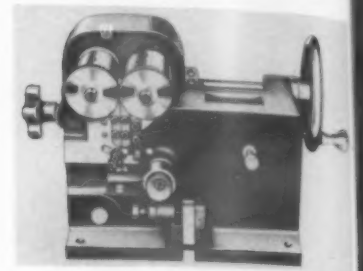
One advantage of the Last Word dresser is that it dresses at the base of the wheel and permits use of the dust collector.

Information is obtainable from Last Word Sales Co., 18500 Mt. Elliott, Detroit 34. Booth No. 438. **T-3-2001**



Spring Coiler

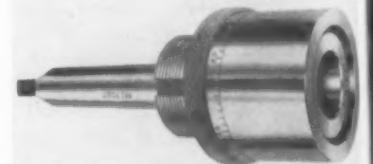
The Perkins precision spring coiler will make torsion, compression, extension and tapered springs coiled either left or right hand with no change of arbors. It will handle wire stocks from 0.005 to 0.125 in. Springs can be made with or without initial tension and with open or closed ends. Individual or small



groups of springs needed for replacements or prototypes can be made in minutes. The spring coiler is equipped with three wire guides, three wire feed rolls and two coiling points. Connors and Davis Sales Corp., West Springfield, Mass. Booth No. 215. **T-3-2002**

Stop Collar

A stop collar and stop nut holder, in a range of sizes, for use on work requiring specified depth of cut has been announced by Metal Cutting Tools, Inc., Rockford, Ill. The depth of the cut is regulated by stopping the adjustable



collar or nut against the jig or workpiece being machined. The company also makes a series of standard and special end cutting tools for metal. Booth No. 200. **T-3-2003**

Precision Lathe

The Hardinge model HLV lathe for toolroom and production work fills the gap between the plain precision bench lathe and the heavy-duty engine lathe weighing one or two tons. Work is speeded up and accuracy assured through three major features of the Hardinge model HLV lathe: an independent variable feed for carriage and cross slide, so the rate of feed can be changed instantly without stopping the machine to shift gears; an independent variable speed for the head-stock spindle to secure every possible combination of speeds within the range of 125 to 3000 rpm.; precision gearbox and lead screw reserved for threading only so the original accuracy of the gearbox and lead screw is sustained for threading operations. Hardinge Brothers, Inc., Elmira, N. Y., Booth No. 1516. **T-3-2004**

Severance REGRINDING SERVICE

RECONDITIONING TO *New Tool* PERFORMANCE AT A FRACTION OF *New Tool* COST

HIGH SPEED *We Regrind* MIDGET MILLS • ROTARY FILES
BURRS • COUNTERSINKS • COUNTERBORES **CARBIDE**
END MILLS • MILLING CUTTERS • REAMERS

**AMERICAN
MAJOR INDUSTRIES
FINDS IT**

PAYS

American Major Industries are now sending their dull cutters to Severance for regrinding because they know (1) strategic material is being conserved (2) quick deliveries are assured (3) their reconditioned tools will give new-tool performance, and (4) their production costs are lowered. This SEVERANCE SERVICE is paying-out for others — It will Pay you tool

At SEVERANCE, New-Tool Craftsmen, using the same precise skill and care that they do in grinding new tools, regrind your cutters. Send in your dull cutters today!

**SEND YOUR
DULL CUTTERS TO**

Severance TOOL INDUSTRIES INC.

728 Iowa Ave., Saginaw, Mich.
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**CATALOG INCLUDING REGRIND PRICES SENT ON REQUEST
Tool Engineers! See a Grinding Demonstration by a
Severance Skilled Craftsman at Booth No. 414
International Amphitheatre—Chicago, March 17-21**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-200

SEVERANCE NEW TOOLS INCLUDE



1/4" SHANK MIDGET MILLS
HIGH SPEED AND CARBIDE

1/8" SHANK JUNIOR MILLS



INSIDE DEBURRING CUTTERS



OUTSIDE DEBURRING CUTTERS



TUBE DEBURRING CUTTERS



CHATTERLESS COUNTERSINKS



HAND DEBURRING CUTTERS



BALL SEAT REAMERS



CARBIDE HAND FILES

Marking Machine



This extra duty, fully pneumatic marking machine is the newest addition to the Jas. H. Matthews & Co. series of 204 marking machines. It has been designed to impress an extra deep mark on tough metal surfaces without exerting extreme pressures and shock to the parts being marked and the marking dies; or where the parts are of such design that they will not withstand the necessary pressure to make the mark in one pass. Jas. H. Matthews & Co., 3923 Forbes Street, Pittsburgh 13. Booth No. 1318. **T-3-2011**



Milling Cutters

The Viking Tool Co. of Shelton, Conn. announces the addition to its line of cutting tools a series of milling cutters. The cutters feature a new method of dual adjustment of the inserted blades in both slotting and half side milling cutters. The cutters are so designed that the blade is advanced in two directions, to the face and outside diameter, as it is stepped out to compensate for wear. It is possible to maintain both slot width and cutter diameter through the life of the blade without the use of any shims or other auxiliary devices. Booth No. 650. **T-3-2012**

Profile Lathe

A new high-speed hydraulic copying or profiling lathe—the H. E. B.—has just been introduced into this country and Canada by H. E. B. Machine Tools, 341 Madison Avenue, N.Y. The lathes are designed and built in France.

The H. E. B. copying lathe, Model OP, achieves complete elimination of vibration even at its top spindle speed of 3,600 rpm, giving maximum output from carbide and diamond tools, for which it was designed. The bed is heavily cross-braced, and together with

a massive one-piece base, forms a foundation so rigid that it need not even be bolted down.

The copying device is an integral part of the machine and has great sensitivity, thus resulting in far greater accuracy than on any other lathe where a separate copying attachment has been added. The machine copies to within plus or minus 0.0004 in. on diameter. Rear tool maintains plus or minus 0.0002 in. on diameter, and axial lengths are copied to within 0.0015 in. Booth No. 1800. **T-3-2013**

1ST
IN
HIGH SPEED
STEEL
HEAT
TREATING

Sentry
Whitin



Sentry Models 2B-YP and 5Y are installed at Whitin Machine Works, Whitinsville, Mass.

Whitin Depends on Sentry for Uniform Tool Hardness!

"Our high-speed steel cutting tools get the uniform, swift, economical Sentry treatment, and we get tools hardened to perfection without distortion or troublesome "skin". A sample production day for one Sentry furnace is 92 large pieces."

See the Sentry Exhibition — Booth 1930, 1952 Industrial Exposition, Chicago, Ill.

REQUEST
CATALOG
W-4



SENTRY MODEL YP
Vertical model
for long, slender
drills, reamers,
broaches, etc.



SENTRY MODEL 2Y
For small tools,
cutters of molybdenum
tungsten and
cobalt high speed
steels.

THE SENTRY COMPANY

FOXBORO, MASSACHUSETTS

INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-201



Gage Blocks

Lifetime carbide and ultra-finish steel gage blocks are manufactured by the Fonda Gage Co., 59 Daly St., Stamford, Conn. Booth No. 715. **T-3-2021**

Stock Feed

The SESCO gripper type stock feed which can be used on almost any punch press is made by Special Engineering Service, Inc., 8161 Livernois Ave., Detroit 4. The various models of stock feeds manufactured by the company are hydraulically-operated units with stock handling capacity of widths from 1/4 in. to 36 in. They will feed any desired length of stock up to 36 in. Accuracy of feed is guaranteed within 0.003 to 0.005 in. on each stroke.

Installation and adjustments are made quickly, and the feed unit can be transferred easily from one press to another when desired. Sufficient power



is available to pull the stock through a roll-type straightener designed to be an integral part of the unit. The feed can be located for operation from left, right, front or back. Booth No. 1142. **T-3-2022**

Laminated Plastic

Hi-Den is a special laminated plastic manufactured by Parkwood Laminates, Inc. of Wakefield, Mass., for use in forming dies, spinning chucks, jig fixtures, gages, and various machinery parts.

It is made from selected wood veneers which are impregnated with phenolic resin and laminated under high pressure and is available in thicknesses up to 2 in., in lengths up to 91 in., and in widths up to 36 in. Booth No. 238. **T-3-2023**

Hydraulic Power Unit



This model 6031 hydraulic power unit, manufactured by the Logansport Machine Co., Inc., Logansport, Ind., is designed to meet JIC specifications. The unit has a fabricated steel tank, oil-tight, flanged at top to prevent splash-over and entry of foreign matter.

The hydraulic relief valve is provided with a means to seal adjustment with a wire-type car seal. The pump suction is fitted with a Skinner immersion-type filter. The suction filter can be removed without disturbing the pump or other parts of the unit. Booth No. 1529. **T-3-2024**

Extraordinary performance and dependability

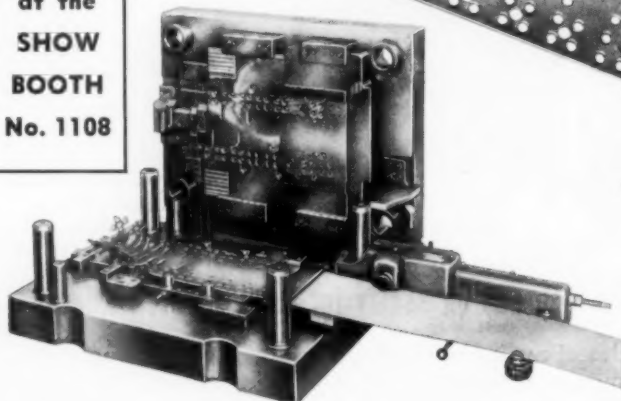
NO service maintenance



See us at the SHOW BOOTH No. 1108



Actual size of work strip measures 21 1/4".



ELEVEN station progressive die for production of right and left hand ignition cable supports. Photograph illustrates Rol-Di-Feed mounted directly on die set, feeding .073" thick x 7 7/8" wide c.r.s. In operation over two years—customer reports no service or maintenance expense!

WRITE TODAY FOR COMPLETE DETAILS

ANOTHER fine example of the outstanding performance characteristics you can expect from Dickerman 9 inch Rol-Di-Feed.

DICKERMAN 9 INCH ROL-DI-FEED

MAJOR manufacturers of appliances, time pieces, sun glasses and cameras, motor laminations, lighting fixtures, locks and prominent stamping companies now use the Rol-Di-Feed.

Investigate the advantages of automatic feeding with Dickerman Rol-Di-Feed.

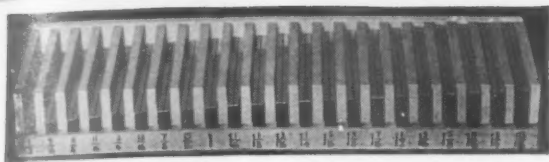
H. E. DICKERMAN MFG. CO.

DEPT. C, 326 ALBANY STREET

SPRINGFIELD, MASS.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-202

ANTON PARALLELS



**Permanently Straight and Accurate
Hardened to 65 Rockwell "C"
Fully Guaranteed to within following
tolerances in height**

Grade	Height	Parallelism and straightness over full length
Standard	±.001"	±.0001"
Precision	±.0001"	±.0001"

COMPLETE SETS (in wooden container)

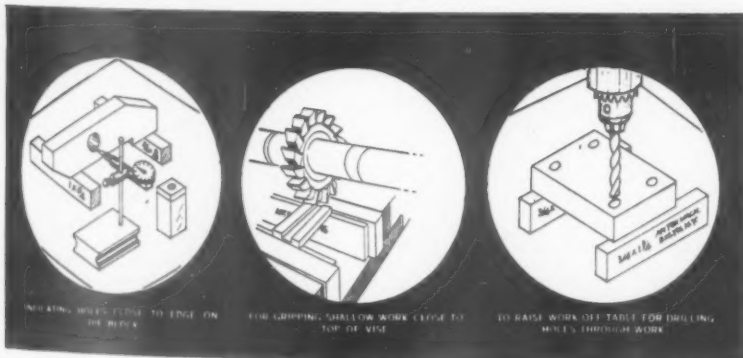
	1/4" Thick x 6" Long (22 Pairs)	1/2" Thick x 6" Long (11 Pairs)	3/4" Thick x 6" Long (11 Pairs)
	1/2" to 1-13/16" High Inclusive by 1/16"	1/2" to 1 1/4" or 1-3/16" to 1-13/16" High Inclusive by 1/16"	1-3/16" to 1-13/16" High Inclusive by 1/16"
Standard	\$115.50	\$ 85.80	\$106.70
Precision	150.70	112.20	138.60

ANTON "MAGNETIC" PARALLELS

1. Anton "Magnetic" parallels are designed for holding work whether small or irregular shape which cannot be held directly on a magnetic chuck.
2. Anton "Magnetic" parallels are made of alternating material with high permeability and low residual magnetism and non-magnetic brass strips.
3. Anton "Magnetic" parallels will protect your magnetic chucks.
4. Anton "Magnetic" parallels will eliminate holding and clamping devices, and speed up production.
5. Anton "Magnetic" parallels are of highest quality.
6. Anton "Magnetic" parallels are reasonably priced so that every tool maker can own it.
7. Anton "Magnetic" parallels are guaranteed against any defects of workmanship.
8. Anton "Magnetic" parallels have no pins of any kind to hold pieces together, and therefore you may cut a blank in any shape you desire.
9. Super parallels are Superior over standard approximately 30% on pulling and 80% on sliding.

STOCK SIZES AND PRICES MAGNETIC PARALLELS

No.	Length (in.)	Width (in.) x Height (in.)	Stand.	Super
P-6251	6	1/4 x 1/2	\$ 3.85	\$ 4.09
P-6252	6	1/4 x 1-13/16	5.27	6.03
P-6501	6	1/2 x 1 1/2	6.07	7.11
P-6502	6	1/2 x 7/8	5.32	6.15
P-6751	6	3/4 x 1 1/4	6.75	8.23
P-931	9	3 x 2 1/4	27.83	38.84



List of Stock Sizes and Prices (in pairs)

Length In.	Width In. x Height In.	Stand- ard	Preci- sion
6	1/4 x 3/8	\$5.28	\$6.86
6	1/4 x 1/2	5.28	6.86
6	1/4 x 5/8	5.28	6.86
6	1/4 x 3/4	5.28	6.86
6	1/4 x 7/8	5.28	6.86
6	1/4 x 1	5.28	6.86
6	1/4 x 1 1/8	5.28	6.86
6	1/4 x 1 1/4	5.28	6.86
6	1/4 x 1 1/2	5.28	6.86
6	1/4 x 1 3/4	5.28	6.86
6	1/4 x 1 7/8	5.28	6.86
6	1/4 x 2	5.28	6.86
6	1/2 x 1/2	7.87	10.23
6	1/2 x 5/8	7.87	10.23
6	1/2 x 3/4	7.87	10.23
6	1/2 x 7/8	7.87	10.23
6	1/2 x 1	7.87	10.23
6	1/2 x 1 1/8	7.87	10.23
6	1/2 x 1 1/4	7.87	10.23
6	1/2 x 1 1/2	7.87	10.23
6	1/2 x 1 3/4	7.87	10.23
6	1/2 x 1 7/8	7.87	10.23
6	1/2 x 2	7.87	10.23
6	3/4 x 1 1/4	9.77	12.69
6	3/4 x 1 1/2	9.77	12.69
6	3/4 x 1 3/4	9.77	12.69
6	3/4 x 1 7/8	9.77	12.69
6	3/4 x 2	9.77	12.69
6	1 x 1 1/2	11.86	15.61
6	1 x 1 3/4	11.86	15.61
6	1 x 1 7/8	11.86	15.61
6	1 x 2	11.86	15.61
6	1 x 2 1/4	11.86	15.61

We also manufacture MAGNETIC V-BLOCKS in Standard and Special Sizes.

Write for Further Details

ANTON MACHINE WORKS, 1226 Flushing Ave., Brooklyn 37, N.Y.

How to LUBRICATE A HORIZONTAL DOVETAIL WAY



View of saddle on Kearney & Trecker CK Milling Machine with table removed to show grooved ways, table nut, and lubricator in lower right corner.

... as KEARNEY & TRECKER does it
with a **BIJUR SYSTEM**

ASTE SHOW

SEE US AT
BOOTH 641



868

To maintain a constant oil film between the table and saddle ways and also between the saddle and knee ways was the problem here. Both problems were solved by building a lubricator into the saddle... controlling the oil flow thru a system of meter-units at all four ways and both knee and table nuts... spreading the oil evenly over all way surfaces thru "Z" grooves in the saddle ways. This is another example of Bijur "team-work for bearing protection." For aid in solving your lubrication problems, call in a Bijur engineer.

BIJUR

LUBRICATING CORPORATION

Rochelle Park, New Jersey

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-204



Coated Abrasives

Field's tapered cone points provide one of the newest forms of coated abrasive applications. There is a wide range of tapers available in these products. Each point is capable of performing a large number of individual operations. Field Abrasive Specialty Manufacturing Company, 14 N. Patterson Blvd., Dayton 2, Ohio. Booth No. 312.

T-3-2041

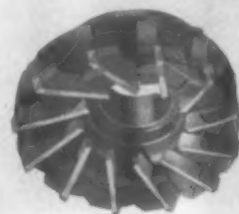
Drawing Oil

Metalub No. 500-B is a drawing oil which may be used straight for severe work or cut back in various proportions with mineral oil for less demanding operations. This product due to chemical treatment affords protection against scoring and pick-up during the draw. Thin and tacky in appearance, it is easily applied to stock by brush, swab or automatic lubricators. No. 500-B may be warmed before application to the stock. Metal Lubricants Co., 3211 South Wood St., Chicago 8. Booth No. 1811.

T-3-2042

Milling Cutter

Kennametal Inc., Latrobe, Pa. has introduced an improved milling cutter, style KF Kennamill, designed primarily for steel production milling runs where adequate horsepower is available, and where intermittent or narrow cuts are encountered. It also well-suited for heavy cast iron cutting.



The KF Kennamill has only four different parts: body, blades, wedges, and nuts. Stud-type wedges and screws are one-piece high-alloy steel, hardened and ground to close tolerances. Booth No. 1723.

T-3-2043

Air Cylinder

The Bendix-Westinghouse Automotive Air Brake Co. features a line of industrial air controls with special emphasis on a revolutionary type of air cylinder known as the Rotochamber.



This low-cost air cylinder used in jig and fixture clamping operations as well as a standard equipment part by equipment manufacturers is frictionless, leakproof and requires no oilers, filters or maintenance. Performance tests and manufacturer operating experiences show that it is capable of millions of strokes and maintains 100 percent efficiency throughout its total life. Booth No. 1717. **T-3-2051**

Screw Cutting Lathe

With its 11-in. swing, 1-in. collet capacity, 1-3/8-in. spindle hole, and center distances of 24 and 36 in., the Logan 955 lathe can handle a high percentage of a shop's lathe-turning opera-



tions. Its ball bearing spindle mounting requires no adjustment for any spindle speed from 45 to 1500 rpm. The two V-ways and two flat ways of its rugged, balanced, warp-free bed are precision ground to a tolerance of 0.0005 in. Its pedestal base makes it suitable for multiple installations.

Information is obtainable from Logan Engineering Co., 4901 West Lawrence Ave., Chicago 30, Booth No. 1130.

T-3-2052

Belt Grinder

An abrasive belt grinder called the Xpeditor is claimed by the manufacturer to be a versatile tool for extending the use of abrasive belt grinding to new applications. The tool can be set at any desired angle in a short time and can be equipped for line contact grinding, precision platen grinding and free belt grinding or polishing. It operates at 5700 sfpm, and the belts are easily and quickly changed. The Heston and Anderson Div., St. Paul Foundry and Mfg. Co., Fairfield, Iowa.

T-3-2053

Cap and Set Screws

The Standard Pressed Steel Co. of Jenkintown, Pa., are manufacturers of the Unbrako line of socket-head cap screws and hollow set screws, pressure plugs and dowel pins. The Unbrako screws range in diameter from 0.060 to three in. Also included is the Flexloc line of locknuts as well as a variety of steel shop equipment. Booth Nos. 1535 and 1543.

T-3-2054

USE READER SERVICE CARD ON PAGE 157 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

SHEFFER PRODUCTS ARE BEST

meet the demand for precision with tools that make precision easy!

FEED FINGERS

"Economy" pusher has ground mid-section bearings: Positive grip with less pressure. More pieces per bar. Also "B B" Master and conventional "squirrel cage" pushers.

HELI-MASTER CAM CUTTER

Cuts flat cams without layouts - directly from engineers' figures. Perfect rises allow greater machine speeds and give longer tool life.

CLOVER-LEAF COLLETS

Standard sizes and designs for all types of automatic screw machines, lathes, milling machines. Special collets made to your prints.

TUBES

Collet tubes and pusher tubes with spools. Collet tube adjusting nuts. Pusher tube bushings for all automatic screw machines.

WRITE FOR LITERATURE

SHEFFER
COLLET COMPANY
TRAVERSE CITY • MICH.

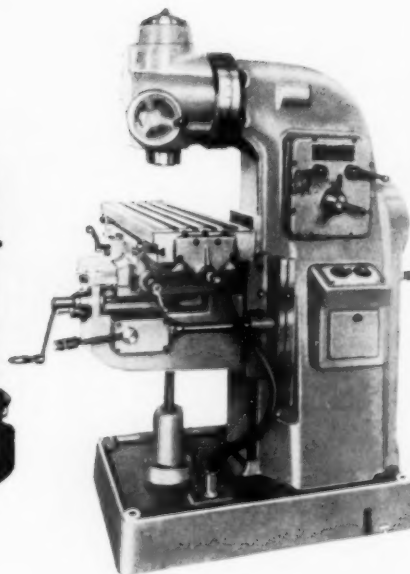
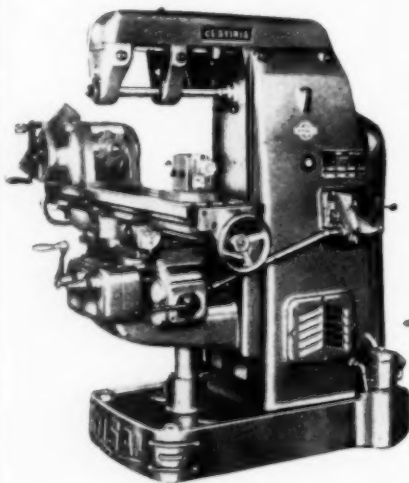
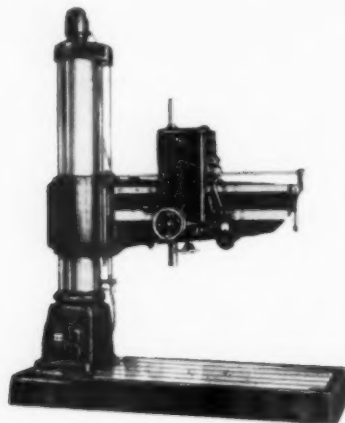
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-205

SEE MACHINES DEMONSTRATED UNDER POWER
AT ASTE SHOW BOOTH 1911

HIGH SPEED MACHINE TOOLS

Delivery from
Stock or Shortly

NO PRIORITY
REQUIRED



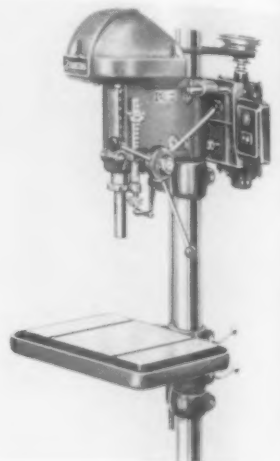
- Engine and Tool Room Lathes
- Universal and Vertical Borers
- Jig Borers
- Gear Hobbers
- Tool and Cutter Grinders
- Surface Grinders
- Horizontal Boring Mills
- Radial Drills

GENERAL REPRESENTATIVE
GRAHAM MACHINE TOOL COMPANY
231 CENTRE STREET • NEW YORK 13, N. Y.
Phone: WOrth 4-8124

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-206

Drill Press

Clausing heavy-duty, 18-in. drill presses are made by the Atlas Press Co., Kalamazoo, Mich. They are designed for production, toolroom, maintenance and service shops. Features include



ball-bearing spindle drive assembly; 63/64-in. diameter spindle; 6 1/2-in. spindle travel; 39-in. maximum distance spindle to table; exclusive vernier depth control stop; double coordinate locks on head and table. Booth No. 1510.

T-3-2061

Centerless Grinder

This centerless grinder, Model 915, is a heavy duty machine capable of removing large amounts of materials at fast feeding speeds and yet maintaining close size tolerances. It differs from the conventional type of centerless grinder in that it uses abrasive bolts in place of hard wheels for both cutting and feeding members.



The use of a belt as a feeding unit offers several distinct advantages over a feed wheel. The feed belt maintains constant contact with the work at all feeding angles and eliminates the need of dressing when either the feeding angle or size of work is changed. This feature reduces setup time to a minimum. The manufacturer is Production Machine Co., Greenfield, Mass. Booth No. 2008.

T-3-2062

HOW MILNE CAN BRIGHTEN YOUR TOOL STEEL PICTURE

...with
these three
cost-reducers

1 Entire length Kolorkoted for permanent, quick-as-a-glance identification... eliminates confusion.



2 Heat treat card of color to match Kolorkote on steel goes with every shipment... eliminates errors.



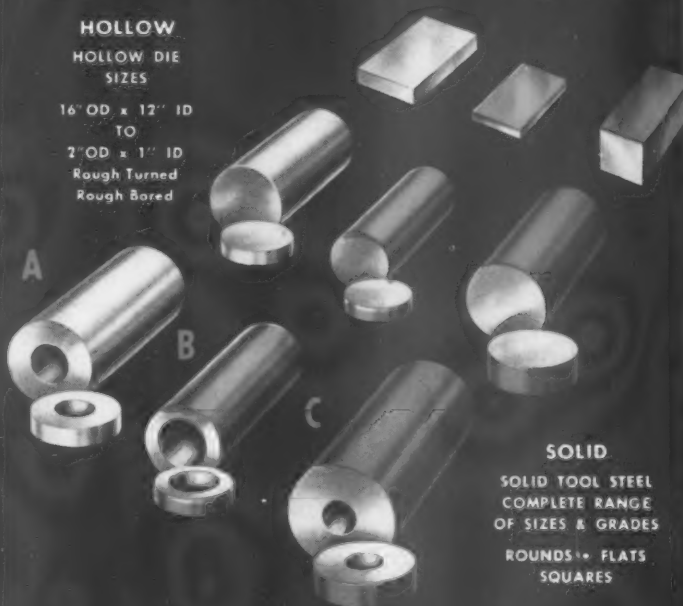
3 Hollow Die Steels with smooth finish inside and out, no scale, no decarb... minimize machining, reduce waste. Saw cut to length.



MILNE'S Kolorkoted TOOL STEELS

HOLLOW HOLLOW DIE SIZES

16" OD x 12" ID
TO
2" OD x 1" ID
Rough Turned
Rough Bored



SOLID

SOLID TOOL STEEL
COMPLETE RANGE
OF SIZES & GRADES

ROUNDS • FLATS
SQUARES

A HIPRODUCTION
HI-CARBON HI-CHROME
AIR HARDENING
"GRAY"
JIC A1

B ORANGE LABEL
WATER HARDENING
"ORANGE"
JIC W10

C AMCOH
OIL HARDENING
"PINK"
JIC O1

America's Leading Tool Steel Specialists

Est. 1887

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LTD.
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SEVAREO METALS
DETROIT, MICHIGAN

D. A. JACKSON, INC.
SALT LAKE CITY

A. MILNE & CO.

Established 1887

745 WASHINGTON ST., NEW YORK 14, N. Y.

America's Leading Tool Steel Specialists
Complete Line Of Tool Steels—Hollow and Solid

TRADE LITERATURE

Free Booklets and Catalogs
Currently Offered By Manufacturers

Work Feed Tables

Illustrated brochure T-85 shows installation photographs and describes in detail various points of standard 22-in. and standard 10-in. tabletop rotary work feed tables; includes dimensional drawings, specification data as well as wiring diagrams and electrical hook-ups to combine the tables with other "packaged" pneumatic devices. **The Bellows Co.**, 222 W. Market St., Akron, Ohio. L-3-1

Wheel Forming

Brochure explains the use of "Dia-form" wheel forming attachment for forming and re-truing of complex forms on grinding wheels, emphasizing speed and economy; step-by-step picture series gives demonstration of the operations involved; specifications and illustrated information on additional equipment included. **Pratt & Whitney Div. Niles-Bement-Pond Co.**, West Hartford 1, Conn. L-3-2

Shop Equipment

Pocket-size folder describes Hall's well line of steel shop equipment; includes pictures, details, shipping weights of such items as cabinet work benches, drawers, shop desks, cabinets, tool stands, carts, etc. **Standard Pressed Steel Co.**, Box 57, Jenkintown, Pa. L-3-3

Grinding

Sixteen-page catalog illustrates and describes Landis' 6- and 10-in. precision cylindrical plain grinding machines; extensive illustrations show jobs the machines will accommodate as well as the features of design; also includes specifications, outline dimensions and equipment. **Landis Tool Co.**, Wayneboro, Pa. L-3-4

Abrasives

Informative catalog No. 75 covers line of abrasive belt and wheel grinding, polishing and buffing machines, including accessories for this equipment; includes specifications and photos of machines in use. **Hammond Machinery Builders, Inc.**, Kalamazoo, Mich. L-3-5

Abrasive Cutting

Informative 36-page booklet DH-30 on "Principles of Abrasive Cutting" discusses methods and applications; also contains data relative to materials cut, cutting capacities; illustrated. **Campbell Machine Div., American Chain & Cable Co., Inc.**, Bridgeport 2, Conn. L-3-6

Welding Alloys

Sixteen-page "1952 Directory" of electrodes and welding alloys contains photos, data and technical information of series for use on cast iron, steel, copper, brass, bronze, aluminum, magnesium, hard and machinable overlays and for cutting all metals. **Eutectic Welding Alloys Corp.**, 172nd St. and Northern Blvd., Flushing 58, N. Y. L-3-7

Files and Burs

Twelve-page illustrated brochure features various types of rotary files, inside, outside and tube deburring cutters, ball seat reamers and threaded and tapered shanks, with price information on HS steel and carbide tools as well as on regrinding service. Explains advantages of using the ground-from-solid line, gives tips on using and recommended operating speeds. Catalog No. 51-812. **The DoAll Co.**, 254 N. Laurel Ave., Des Plaines, Ill. L-3-8

Series 2500
9-inch mill
with 12 blades



The Gairing

E-CON-O-MILL STANDARD FACE MILLS

To economize . . . standardize on E-Con-O-Mill. First made five years ago, these sturdy mills not only proved themselves tools of truly one-piece rigidity, but have effected important savings on these points:

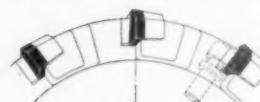
They Cut Down Tool Inventory. One size of tungsten-carbide blade fits bodies of all sizes. And, by changing blades, all mills can be equipped for cutting steel, cast iron and nonferrous.

They Save On Grinding Costs. New blades come finish-ground, ready for work. It takes no great skill to re-sharpen them individually to a gage on a carbide grinder. Or, if you prefer, the cutter can be re-sharpened on a cutter grinder.

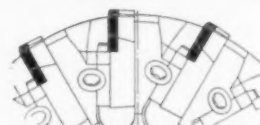
They Reduce Machine Down-Time. Blades are changed easily, may be replaced by new or re-sharpened blades without taking the cutter from the machine.

AVAILABLE FROM STOCK FOR IMMEDIATE DELIVERY. All sizes of right- and left-hand mills, Series 2500, are stocked for National Standard Arbor and National Standard Drive. Series 4500 and 6500 are available on short order.

OFFERED IN 3 LINES



Series 2500 cone-type mills in sizes from 5 to 16-inch dia. (Eight-inch mill has 8 or 10 blades)



Series 4500 with heavier bodies in sizes from 8 to 16-inch dia. (Eight-inch mill has 10 or 12 blades)



Series 6500 cone-type mills with greater number of blades, sizes 8 to 14 inch, specially recommended for cutting cast iron. (8-inch mill has 16 blades)

The GAIRING TOOL COMPANY, Box 478, Detroit 32, Michigan

SEE US AT THE TOOL SHOW, Booth 738

See these E-Con-O-Mills, and other examples of Gairing Standard Tools: Interchangeable Counterbores, Core Drills, Block-Type Boring Tools. A display of special Multi-Operation Cutter Heads will also be featured.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-208



See us at Booth No. 1714 ASTE Industrial Exposition
International Amphitheatre Chicago, Mar. 17-21, 1952

E. A. BAUMBACH MFG. CO.

1812 SO. KILBOURN, CHICAGO 23, ILL.

Advantages of Baumbach Demountable Pins and Bushings in Standard Precision Die Sets
Accuracy and Alignment
Flexibility Reduced Die Costs—Reduced Maintenance Costs—Safety and Hold Down Insert

SHANK— $\frac{3}{4}$ TO 3" UPON REQUEST

$1\frac{1}{4}$ —12 STANDARD THREAD
LARGER UPON REQUEST

CLEARANCE HOLE FOR
BUSHING

KEY—TAPERED AND TRIANGULAR FOR
LOCKING SHANK

BAUMBACH HARDENED AND GROUND BUSHING
MADE OF SPECIAL ALLOY STEEL OF HIGH
MANGANESE CONTENT

ENTRY FOR DIE CASTING WITH
APEX #3 TO KEY PIN IN
POSITION

BAUMBACH HARDENED AND GROUND LEADER PIN
MADE OF SPECIAL ALLOY STEEL OF HIGH
MANGANESE CONTENT

.006 PRESS FIT PIN INTO FLANGE

SPECIAL APEX #3 ALLOY KEY FOR
MAXIMUM SHEAR STRENGTH AND SUPPORT

NOTE LOCATION OF SCREWS AND
DOWELS FOR ADDED RIGIDITY

SET ASSEMBLY
CONSISTS OF

- 1—SHANK AND KEY
- 1—PUNCH HOLDER
- 1—PAIR BAUMBACH DEMOUNT-
ABLE BUSHINGS PAT. #2238302
- 1—PAIR BAUMBACH DEMOUNTABLE LEADER
PINS PAT. #2238302
- 1—DIE SHOE AND HOLD DOWN INSERT
- 1—SET OF BAUMBACH RITE FIT DOWEL PINS
- 1—SET OF BAUMBACH CAP SCREWS

PUNCH HOLDER AND DIE
SHOE ARE BLANCHARD
GROUND THEN SEASONED
SURFACE GROUND AT TIME
OF ASSEMBLY

MILD STEEL FLANGE
WITH MOUNTING FACE
PRECISION GROUND AT
RIGHT ANGLES TO IN-
SIDE DIAMETER OF
BUSHING

BAUMBACH CAP SCREW
BAUMBACH RITE FIT
DOWEL PIN

OIL GROOVE

KEY GROOVE

MOUNTING FACE PRE-
CISION GROUND AT
RIGHT ANGLES TO OUT-
SIDE DIAMETER OF PIN

CLEARANCE HOLE FOR
PIN

BAUMBACH DESIGN
GIVES ADDED WORKING
AREA AND STRENGTH

HOLD DOWN INSERT

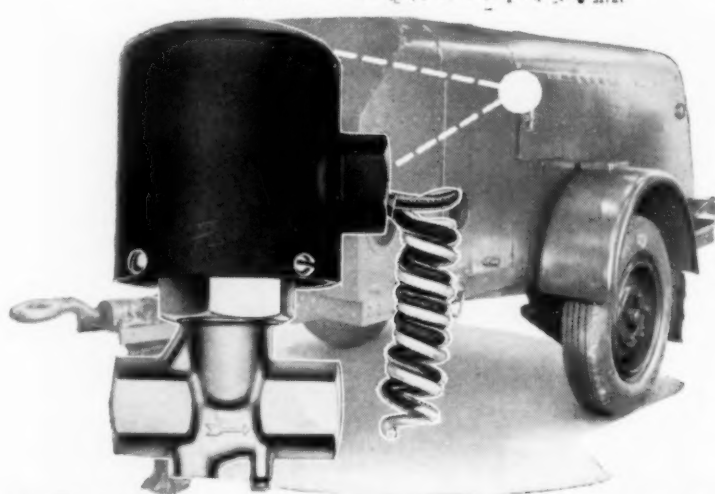
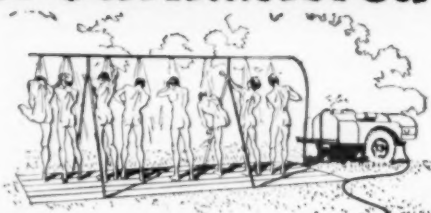
WELD CHANNEL

WRITE FOR FULL DETAILS OF BAUMBACH'S AUTOMATIC ALIGNMENT WITH PAT'D. DEMOUNTABLE LEADER PINS, BUSHINGS

**DIE SET, LAYOUT SHEETS AND
CATALOGS FURNISHED UPON REQUEST**



Shower Bath...Korea Style



Thanks to this dependable A-P solenoid-valve equipped mobile shower unit

Drawing and heating water from any nearby stream or other source, this Cleaver-Brooks mobile shower unit provides hot, relaxing baths for battle-worn soldiers . . . helps keep health and morale at peak.

And performing a vital service on this unit is the A-P Type 73 RJX Solenoid valve, selected because of its dependable, unvarying performance under any conditions.

Whether you need solenoid valves for your product, or whether you need them to control the flow of air, liquids, gases or refrigerants in processing parts — specify A-P controls. The wide range of A-P control valves permits easy selection of the right type for your particular need.

Remote-control solenoid valves, pilot operated. Capacities from 300 to 3000 gallons per hour. Positive opening and seal-off and quiet, nonstick operation are features of all A-P solenoid valves.

Pressure or temperature controlled throttling valves, pressure regulated water valves, thermo-electric gas valves and gas- or oil-heater control valves are all standard A-P products. Write to us whenever your tool problems involve a control valve.



DEPENDABLE controls

A-P CONTROLS CORPORATION

(formerly Automatic Products Company)

2402 N. 32nd St., Milwaukee 45, Wis. • In Canada: A-P Controls Corp., Ltd., Cooksville, Ont.
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-210

Industrial Freezers

Condensed specification bulletin tells about the line of industrial mechanical freezers for such work as shrink metal stabilizing or hardening, testing, research, processing or storage. Table shows standard specifications. **Webb Appliance Co., Inc.**, 2740 Madison Ave., Indianapolis 3. L-3-11

Presses

Illustrated bulletin No. 215 presents line of open back inclinable presses with descriptions of various models; cut-away drawings bring out special advantages and construction features and engineering diagrams explain stroke operations; specification tables included. **Clearing Machine Corp.**, 6499 W. 65th St., Chicago 38. L-3-11

Balancing

Folder presents full discussion of Annis Dynograph dynamic balancing machine, explaining its main features, operation and advantages; schematic diagram further explains its makeup and use; specification table gives size details. Different model balancers for various uses also included. **R. B. Annis Co.**, 1101 N. Delaware St., Indianapolis 2, Ind. L-3-11

Precipitators, Oil

Illustrated folder E-50 presents information concerning oil mist precipitator; drawing and text explain principle of its operation, construction and application; also offers suggestions for mounting methods; table shows dimensions and specifications. **Trion, Inc.**, 1000 Island Ave., McKees Rocks, Pa. L-3-12

Dust Collectors

Twenty-four page catalog presents information on both cabinet and cyclone type dust collectors as well as complete line of fittings and accessories; blueprint sketches give over-all dimensions of each unit, and illustrations demonstrate adaptability. **Torit Manufacturing Co.**, Walnut & Exchange Sts., St. Paul 2, Minn. L-3-13

Alloys

"Brief Facts About Ampco Metal and Other Ampco Alloys" presents information about their uses in bearings, gears, cams, dies, wear strips, stressing economy; corrosion resistant applications as well as physical properties and photomicrographs of the alloys are included. Bulletin G-1, **Ampco Metal, Inc.**, 1745 S. 38th St., Milwaukee 15. L-3-14

Press Brakes

Illustrated catalog gives design details and specifications of the complete line of Verson press brakes with capacities from 15 tons up; both mechanical and hydraulic types are covered. **Verson Allsteel Press Co.**, 9336 S. Kenwood Ave., Chicago 19. L-3-15

Inspection

Booklet, "The Theory of the Microscope", presents non-mathematical explanation of how the instrument works, with notes on conditions which influence optical performance; also treats objectives, eyepieces, condensers, filters and types of illumination; drawings and photos aid clarification. **Bausch & Lomb Optical Co., Dept. FF-1—Bureau of Education, Rochester 2, N. Y.**
L-3-16

Dust Control

"Dust and Fume Control", 36-page catalog 72-B, describes Dustube collectors and advantages of cloth filtration; complete specifications, construction drawings, cut-away views and illustrations of typical installations accompany description of each type. **American Wheelabrator & Equipment Corp., Mishawaka, Ind.**
L-3-17

Collet Chuck

Informative 8-page catalog, "Get a Better Grip on Production", describes Sutton "Levermatic" collet chuck; cross-sectional drawings and photos of chuck in action on standard and special applications point out particular features and advantages. **Sutton Tool Co., Sturgis, Mich.**
L-3-18

Measuring and Control

Approximately 100 measuring and control instruments and valves including several recently introduced designs, are covered in 28-page composite catalog No. 5000 describing principal items related to this field manufactured by Industrial Div., **Honeywell Regulator Co., Station 40, Wayne & Windrim Aves., Philadelphia 44.**
L-3-19

Screw Machines

Widely illustrated 32-page booklet, recently published by Andre Bechler, Ltd., of Moutier, Switzerland, covers history and development of Swiss Automatic screw machines, emphasizing their precise construction, controlled production and inspection, and the broad fields of application. Available through Bechler's U. S. representatives, **Cosa Corp., 405 Lexington Ave., New York 17.**
L-3-20

Copper Alloys

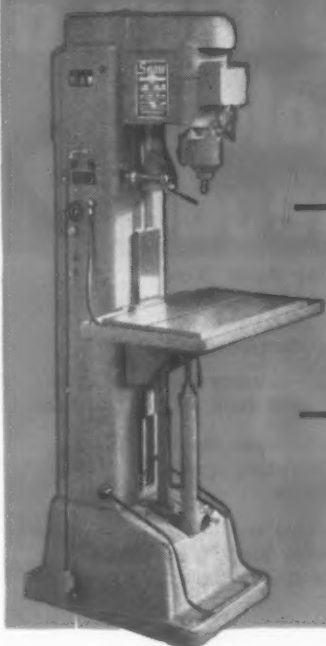
Thirty-two page brochure B-3 suggests cutting speeds, feeds, tool rakes and clearances to be used on more than 40 different copper alloys; based on use of standard cutting tool materials; contains practical suggestions on turning and cutting-off tools, form tools, drills, reamers and taps, thread chasers, milling cutters and coolants. Tables show compositions, physical constants and properties on copper, brass, bronze free cutting, general purpose and engineering rods, weight tables and conversion factors. **The American Brass Co., Waterbury, Conn.**
L-3-21

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR! 3800 PER HOUR! 2500 PER HOUR!

*For Top
Production*



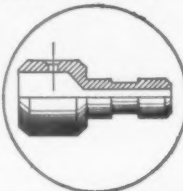
SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

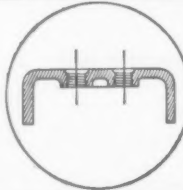
DRILLING

Crossdrill and "T" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling
Machine



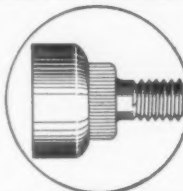
TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes
per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping
machine



THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading
machine



SNOW

MANUFACTURING COMPANY

435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production. Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

Submit Sample Parts for Production & Cost Estimates

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-211



MORE than a "Coolant" is needed

"COOLANT" is a misnomer as applied to *cutting fluids*. You won't get far with just a coolant. The fluid used for metal cutting must have multiple characteristics in order to provide the desired finish and tool life at the required production rate:

- **Cooling Action** — very necessary to carry away the heat generated by machining, but only part of the function.
- **Lubricity** — to reduce friction between the tool point and the work piece. The lubricating qualities of the cutting fluid make a big difference.
- **Anti-Weld Properties** — to prevent build-up of metal on the tool and scuffing of the work piece. The amount of anti-weld agent in the fluid is a critical factor and depends on the job.

These factors and others are all inter-related.

Over-simplification of the subject and the cutting fluid can lead to trouble. Let a Stuart sales-engineer show you what can be accomplished with the *right* cutting fluid.

Ask for Bulletin



D.A. Stuart Oil Co.

2727-49 S. Troy Street, Chicago 23, Ill.

TIME-TESTED

Cutting Fluids and Lubricants

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-212

Grinding and Polishing

Descriptive pamphlet deals with company's "Di-Profiler" grinding and polishing machine which combines reciprocating, rotating and oscillating action. Series of photos show tool at work in different applications; specifications included. **Nord International Corp.**, Denville, N. J.

L-3-22

Presses

Number 3, Volume 3, of company's regular publication carries extensive information about its Multi-presses, giving case histories, application data, stressing economy and other advantages widely illustrated. **The Denison Engineering Co.**, 1160 Dublin Rd., Columbus 16, Ohio.

L-3-23

Electric Tools

Bulletin 39, "Keep 'Em Working", aimed at helping users of 180- and 360-cycle electric tools with maintenance, application and safety notes, pointing out increased production possibilities well illustrated. **The Rotor Tool Co.**, 17325 Euclid Ave., Cleveland 12.

L-3-24

Hardening Compounds

Four-page reprint, "Hardening Compound Carburizes, Nitrides and Chromizes Steel", describes means of application of steel hardening chemical compound known as "Hard'N'Tuff", touches on its use, advantages, applications, resultant properties provided, and limitations. **Doughty Laboratories, Inc.**, 500 Fifth Ave., New York.

L-3-25

Press, Underdrive

Complete catalog shows line of single, double and triple action underdrive presses with 400-ton capacity and over; photos, engineering drawings and graphs help to explain main features, construction, advantages and operations. **Danly Machine Specialties, Inc.**, 2100 S. Laramie Ave., Chicago 30.

L-3-26

Chrome Plating

Six-page folder tells about advantages of Chromaster industrial chrome plating units, emphasizing speed, efficiency and economy; lists possible applications for various types of shops. Industrial Chrome Div., **Ward Leonard Electric Co.**, 31 South St., Mount Vernon, N. Y.

L-3-27

Face Grinders

Complete catalog of full line of Best-Bowen radial head face grinders, designed as multi-purpose machines; bulletin includes complete specifications for and examples of cost-cutting grinder applications. Grinder Div., **Best-Wells Corp.**, Beloit, Wis.

L-3-28

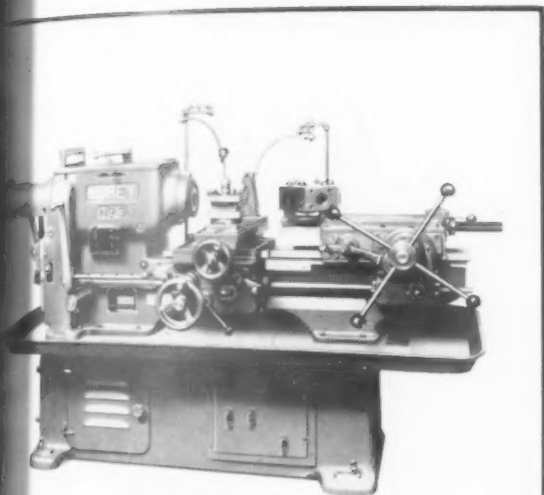
The Tool Engineer

MOREY

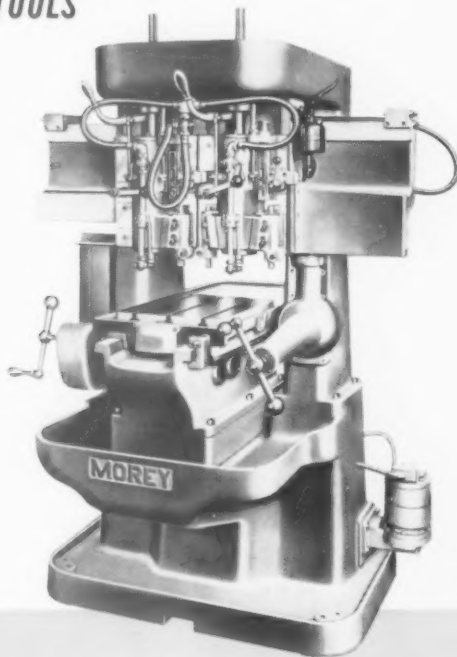
...for more value!

*See us at the
A.S.T.E. exposition
at Chicago in March*

**LET MOREY MEET YOUR
REQUIREMENTS FOR THE FINEST
IN MACHINE TOOLS**



MOREY No. 3 UNIVERSAL TURRET LATHE, for ease and simplicity of operation. Rigid construction. Infinite number of spindle speeds within the range.



MOREY 12-M Double Spindle, High Speed VERTICAL PROFILER and Milling Machine . . . For rapid economical duplication of small parts requiring accurate interchangeability with minimum effort.

DISTRIBUTORS OF:

BORING MILLS: PEGARD

MILLING MACHINES: JASPAR

HERO • HURE • PEGARD

S.A.B.C.A. • STEINEL

RADIAL DRILLS: G.S.P.

IRONWORKER (Universal):

WORMSER

PRESSES: RASKIN

LATHES: KERN • MUELLER

PEGARD • STAR

SIMPLEX • VIKING

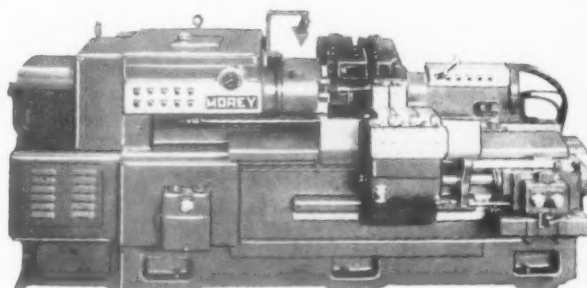
SELECTRONIC

MULTI-PURPOSE MACHINE:

HOMMEL

We are also general representatives for **HAHN & KOLB**, who have approximately 50 major machine tools and accessories.

MOREY AUTOMATIC LATHE: As illustrated, tooled for the complete turning and facing operation of an automotive steering knuckle and other parts from the rough forging to finish size in one chucking.



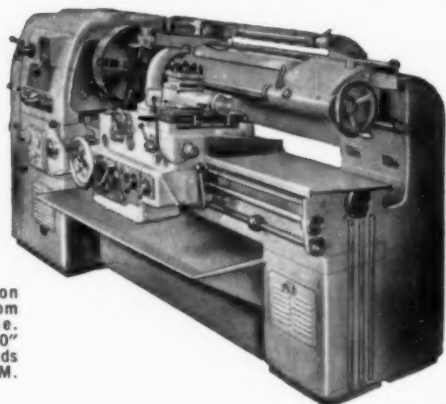
INDEX

LATHES	PAGE 2
MILLING MACHINES	PAGE 3
RASKIN PRESSES	PAGE 4
GRINDING MACHINES	PAGE 5
MISCELLANEOUS	PAGE 6

MOREY MACHINERY CO., INC. • 410 BROOME ST. • NEW YORK 13, N. Y.

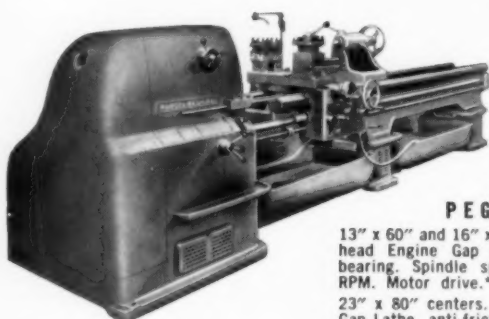
LATHES

Illustrated and briefly described here are just a few of the many fine lathes from these prominent European manufacturers. BONDYCOP Hydraulic Copying Attachments also available for all types of lathes.



PEGARD

SENSITAST Precision combination toolroom and Copying Lathe. Geared head. 19" x 40" centers. Spindle speeds (18): 27-2200 RPM. Motor drive.



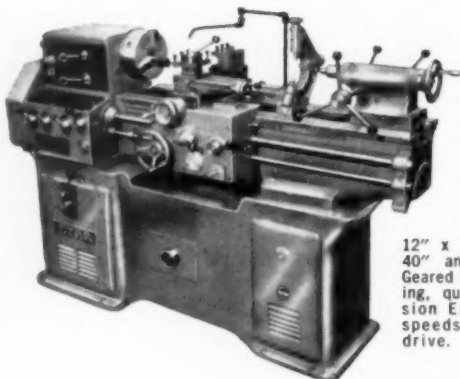
PEGARD

13" x 60" and 16" x 60" centers. Geared head Engine Gap Lathes, anti-friction bearing. Spindle speeds (16): 38-2000 RPM. Motor drive.*

23" x 80" centers. Geared head Engine Gap Lathe, anti-friction bearing. Spindle speeds (12): 6-1000 RPM. Motor drive.*

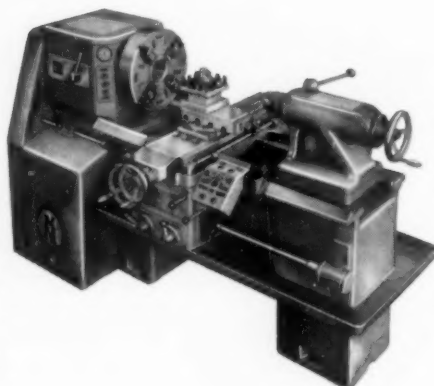
27" x 120" centers. Geared head Engine Gap Lathe, anti-friction bearing. Hardened and ground steel bedways. Spindle speeds (12): 6-1000 RPM. Motor drive.

*These machines are available with hardened steel bedways as extras.



STAR

12" x 20", 12" x 30", 12" x 40" and 14" x 50" centers. Geared head, anti-friction bearing, quick change gear, Precision Engine Lathes. Spindle speeds: 60-1800 RPM. Motor drive.



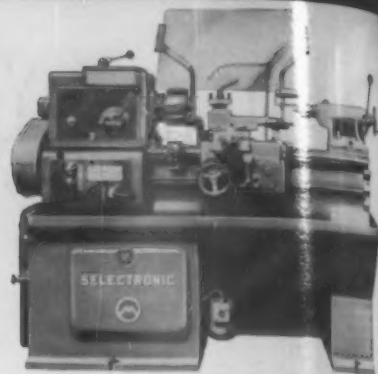
MUELLER

19" x 40" centers. Production Lathe. Spindle speeds: 250-1500 RPM. Motor drive.

19" x 40" centers. Production Lathe, Hydraulic Tracer controlled. Spindle speeds: 250-1500 RPM. Motor drive.

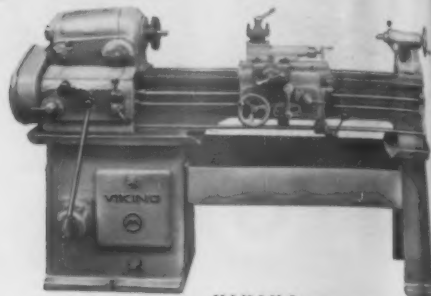
24" x 30" centers. "Electromatic" Production Lathe. Spindle speeds (infinitely variable): 50-750 RPM. CONSTANT CUTTING SPEED. Motor drive. Also available with Transverse Copying Attachment.

24" x 60" centers. Production Lathe, Hydraulic Tracer controlled. Spindle speeds: 50-560 RPM. Motor drive.



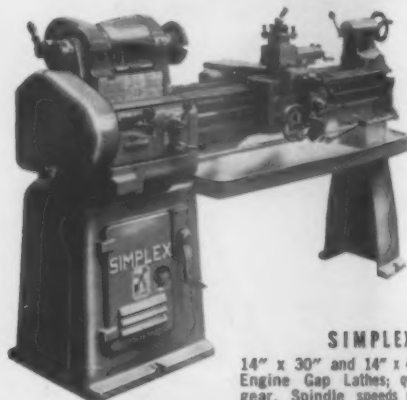
SELECTRONIC

13" x 22 1/4" centers. Production lathe. Pre-selector speed control. Spindle speeds (variable): 125-1000 RPM. Motor drive . . . Can be supplied with Hydraulic Copying Attachment (BONDYCOP).



VIKING

13" x 30" and 13" x 40" centers. Engine Gap Lathe, anti-friction bearing. Spindle speeds (infinitely variable): 35-1200 RPM. Motor drive.



SIMPLEX

14" x 30" and 14" x 40" centers. Engine Gap Lathes; quick change gear. Spindle speeds (12): 60-1800 RPM. Motor drive.



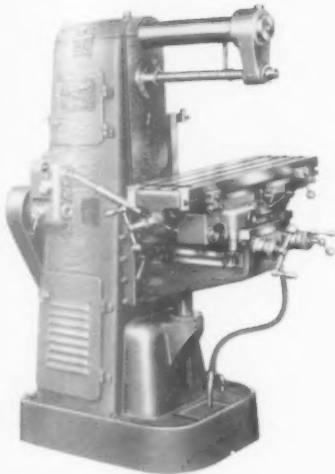
KERN

16" x 40" centers. Precision, Geared head Engine Gap Lathe. Spindle speeds: 48-1200 RPM. Motor drive.

PROMPT
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MORE

MILLING MACHINES

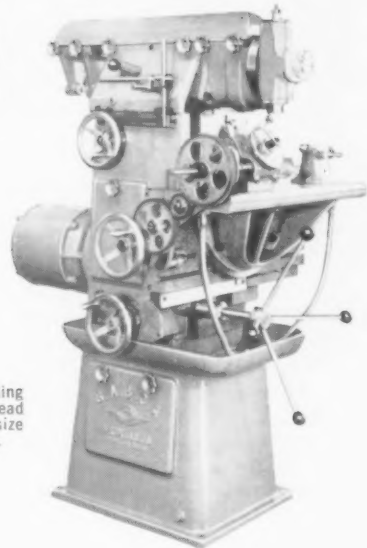


HERO

Model 4P Plain Horizontal Milling Machine. Table size 30" x 9 1/4". Longitudinal table traverse 20". 2 HP Motor Drive.

Model 4U Universal Horizontal Milling Machine. Table size 30" x 9 1/4". Longitudinal table traverse 20". 2 HP Motor Drive.

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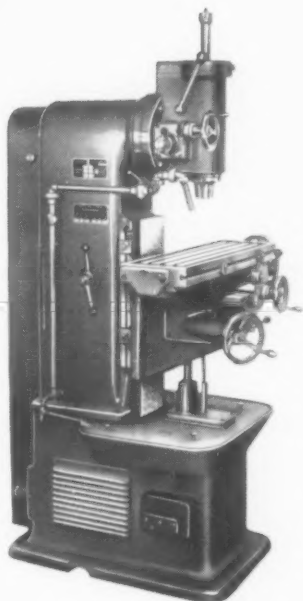
S.A.B.C.A.

Model JRC2 Vertical Milling Machine with Swivel Head and Swivel Table. Table size 30" x 9 1/2". Motor Drive.

STEINEL

Model SV 4D Universal Head Vertical Milling Machine; swivel head. Table size 29" x 8". 1 1/2 HP Motor Drive.

Model SH 4A Hand Feed Horizontal Milling Machine. Table size 7" x 30". 1 1/2 HP Motor Drive.



MOREY brings you these world famous milling machines from Europe's leading manufacturers . . . Prompt deliveries without priority!

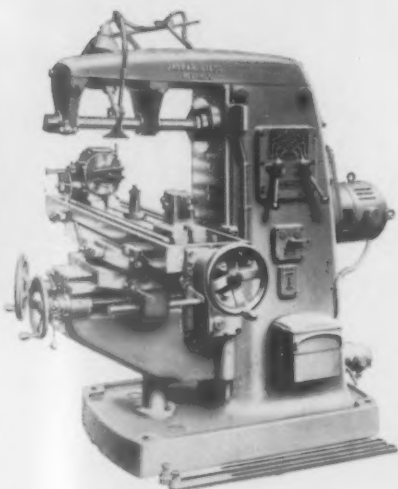
Powerful, accurate new production and tool-room equipment — Plain and Universal types, Horizontal or Vertical. They are extremely flexible machines designed and built for heavy duty . . . And backed by MOREY, builders, rebuilders and distributors of machine tools for over 40 years.

HURE

Model 73 Universal Milling Machine; swiveling Universal Milling Head. Power Rapid Traverse. Table size 57-3/32" x 12-13/64". 5 HP Motor Drive.

Model 74 Universal Milling Machine; swiveling universal milling head. Table size 64-15/16" x 13". Power Rapid Traverse. 6 HP Motor Drive.

Model V274 Vertical Milling Machine; swivel head type. Working surface 63" x 14-61/64". Power Rapid Traverse. 7 HP Motor Drive.



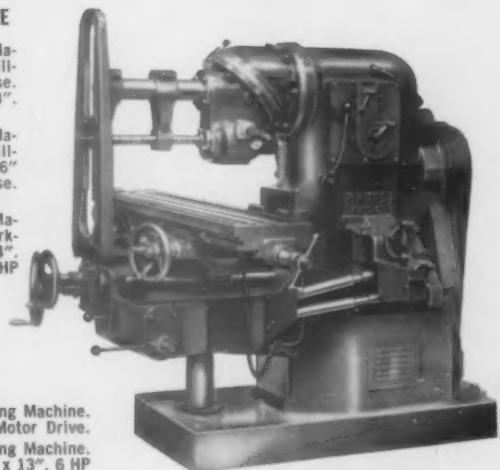
JASPAR

Model 2CR Universal Horizontal Milling Machine. Table size 37 1/2" x 8 3/4". 2 1/2 HP Motor Drive.

Model 3CS Universal Horizontal Milling Machine. Power rapid traverse. Table size 49" x 13". 6 HP Motor Drive.

Model 3CR Universal Horizontal Milling Machine. Table size 52" x 12". 5 HP Motor Drive.

Model 3MCD Universal Horizontal Milling Machine. Table size 52 3/4" x 12". Power rapid traverse. 6 HP Motor Drive.



for more value!

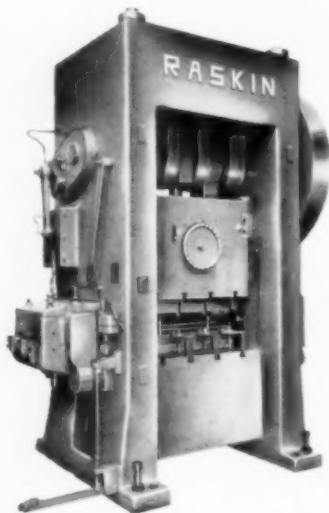
WORLD FAMOUS

RASKIN PRESSES

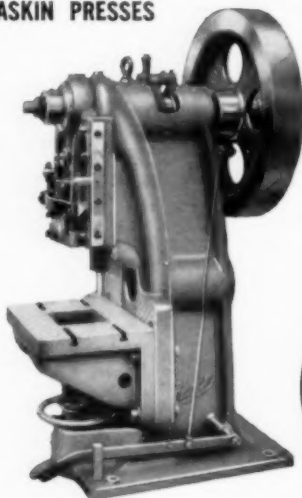
Only a handful of the top quality presses from one of Europe's leading manufacturers! We're ready to meet your requirements with this ruggedly built equipment of the most modern design.

CHECK THE FEATURES OF THESE RASKIN PRESSES

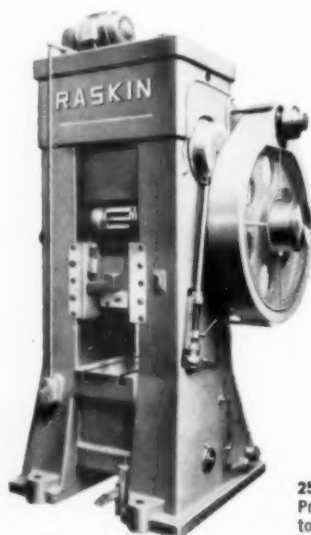
- Fully seasoned high tensile castings.
- Crankshafts of nickel-chrome Molybdenum steel with a 126,000 lb. tensile and 16% elongation.
- Extra long gibs for longer die life.
- Protected from overload by shear pins in the clutch.



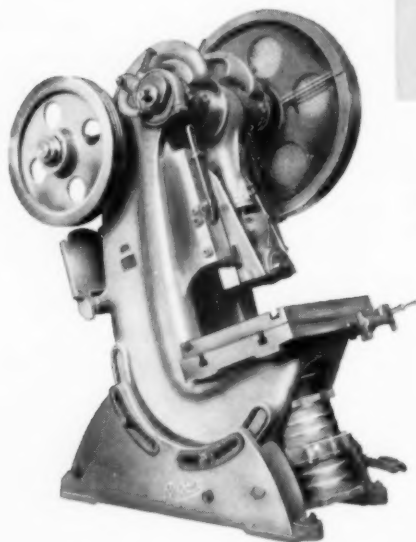
150-ton Double Crank High Production Straight Side Press from 30 to 500 tons.



50-ton Horn Press with adjustable and swivel table. From 20 to 120 tons.



250-ton Knuckle Joint Press from 125 to 1000 tons.



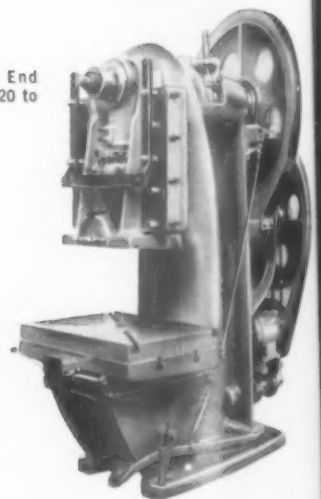
77-ton Geared Press, O.B.I. From 6 to 110 tons.



200-ton Double Crank Straight Side Press from 30 to 500 tons.



110-ton Heavy Duty Geared Press, O.B.I.



120-ton Geared End Wheel Press. From 20 to 300 tons.

PROMPT
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MORE

GRINDING MACHINES

... For Every Requirement!

HAHN & KOLB

Model WSR-0 Universal Tool & Cutter Grinder. Centers swing 10" diameter. Takes 19 1/4" in length. Table travel: 16". Motor drive.

HAHN & KOLB

Model LHD-0 Hydraulic Lapping Machine. Lapping wheel dia. (Max.): 16". Max. distance between cast iron lapping wheels: 3 1/4". Motor drive.

HAHN & KOLB (Not Illustrated)

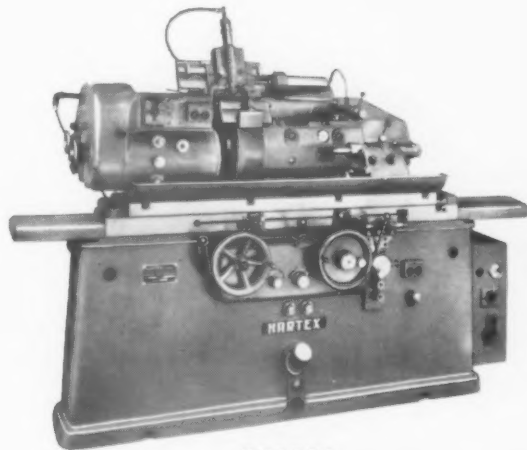
Model E2: Tool Grinding & Lapping Machine. Pedestal type with motor in pedestal base. Wheel diameter 6". Motor drive.

Model OS 11a: Precision Twist Drill Grinding Machine. Pedestal type. Motor drive.

PROMPT
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PRIORITY

HERMAN KIRCHNER

Model RS795c: Plane-parallel Snap Gauge Grinding Machine. Max. snap gauge cap. 20". Min. 117". Max. length of surface ground: 3.28". Table stroke adjustable: 0-4 3/4". Motor drive.



HARTEX

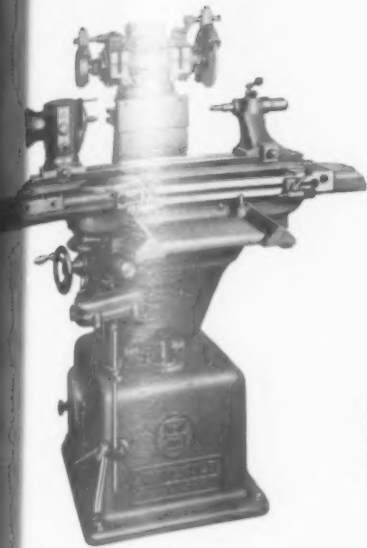
Model RHP-620 Productive Plain Hydraulic Grinder. Max. length of work ground: 24 1/2". Max. swing over table: 13". Grinding wheel 16" x 2". Max. table swivel: 9". Automatic infeed. Table speeds: variable from 12" to 240" per min. Plunge grinding feeds (6): Plunge rapid return. Motor drive.

Model RHP-1020 Productive Plain Hydraulic Cylindrical Grinder (Not illustrated). Max. length work ground: 40". Max. swing: 13". Grinding wheel: 16" x 2". Max. table swivel: 8". Automatic infeed variable. Table speeds variable: 12" to 240" per min. Plunge grinding feeds (6): Plunge rapid return variable. Motor drive.



HARTEX

Model BED-4 Centerless Grinding Machine. Max. dia. ground: 2". Min.: .04". Standard grinding wheel: 14" x 5". Standard control wheel: 9" x 5". Motor drive.



HARTEX

Model RH-620 Universal Hydraulic Grinder. Max. length ground: 24 1/2". Swing: 12". Grinding wheel: 14" x 2". Max. swivel of table: 12". Table speeds, variable from 12" to 240" per min. Motor drive.

Model RH-1020 Universal Hydraulic Grinder (Not illustrated). Max. length ground: 40". Swing: 12". Grinding wheel 14" x 2". Max. swivel of table: 8". Table speeds, variable from 12" to 240" per min. Motor drive.

MISCELLANEOUS MACHINE TOOLS

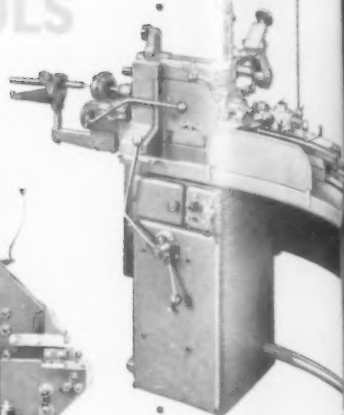
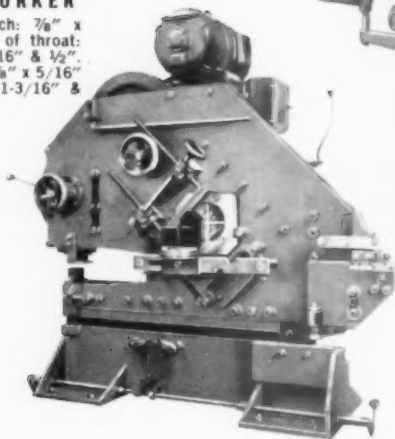


AJAX

Radial Drilling Machine. 4'6" arm x 13" column. Drilling cap.: 2 3/4" mild steel; 3" cast iron. #4 M.T. Spindle speeds (8): 60-1100 RPM. Motor drive.

WORMSER IRON WORKER

Models T-15 and T-25. Punch: 7/8" x 7/16" & 1" x 9/16". Depth of throat: 14" & 16". Shears plates: 7/16" & 1/2". Shears angles (square cut): 3/8" x 5/16" & 4" x 3/8". Shears round: 1-3/16" & 1 1/2". Motor drive.



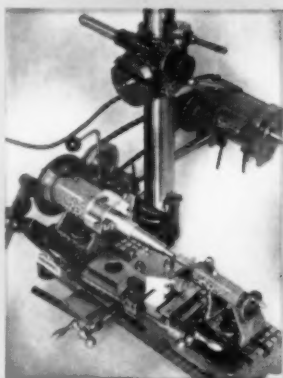
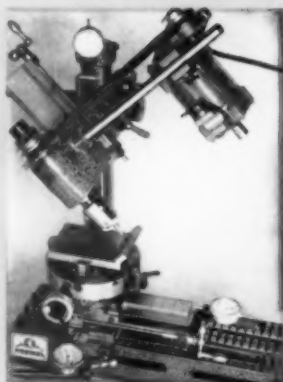
HAHN & KOLB

Model RH-25 High Speed Precision Hand Screw Machine. Bar cap. of bar work: dia. 1" max. 6 holes in turret. Dia. holes: 1/8" to 1/2". Max. turning length: 24". 1200 RPM. 6 spindle speeds. Motor drive.

HAHN & KOLB

Model HK-3 SL High Speed Filing & Sawing Machine. Throat gap: 9-1/16". Table size: 15 3/4" x 15 3/4". No. of strokes, inf. variable: 71-265. Motor drive.

Model HK-25 H.S. Filing & Sawing Machine (Not ill.). Throat gap: 6 1/4". Table size: 11" x 11". Stroke speed per min.: 118-170-236-335. Motor drive.

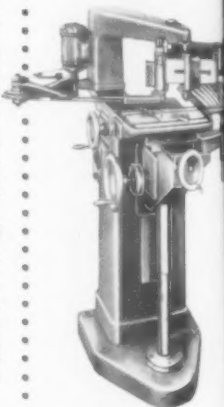


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HAHN & KOLB

Model SU Pedestal type Pantograph Engraving Machine. 2 dim. wkg. table: 17" x 12". Panto. movement: Longit.: 12"; trans.: 8". Spindle speeds (6): 2800 - 15,000 RPM. Motor drive.

Model GMD Pantograph Engraving Machine (Bench type) - Not illustrated. Panto. ratio: 1-2 to 1-8. Wkg. table size: 8 x 14. Spindle speeds (4): 5000-12,000. Motor drive.



HOMMEL

Multi-purpose lathes for turning, milling, drilling and jig boring. Motor drive.

NOT ILLUSTRATED:

BJ 12" Metal Cutting Band Saw, Floor type. Hinged table tilting 10° left to right and 10° front to back. Work table: 20 3/4". Throat: 10 3/4". Blade speeds (9): From 45 1/2 to 1324 ft. per min. Motor drive.

BONDYCO Hydraulic Copying Attachment for Engine Lathes. Equipped with motor driven hydraulic pump with tank. Max. tool cross travel: 3". Motor drive.



PEGARD

HORIZONTAL BORING MILL

Model U-80: Spindle dia.: 3 1/8". #5 M.T. Table dim.: 33" x 49". Max. dist. spindle to table: 37-7/16". Table travel: Longi.: 51". Transv.: 3 1/2". Spindle speeds (18): 10-1600 RPM. Motor drive.

Model U-100: Spindle dia.: 3-15 1/8". #6 M.T. Table dim.: 47" x 71". Table travel: Longi.: 63"; cross: 63". Dist. spindle to table: 53 1/4" max. Spindle speeds (18): 7-1400 RPM. Motor drive.

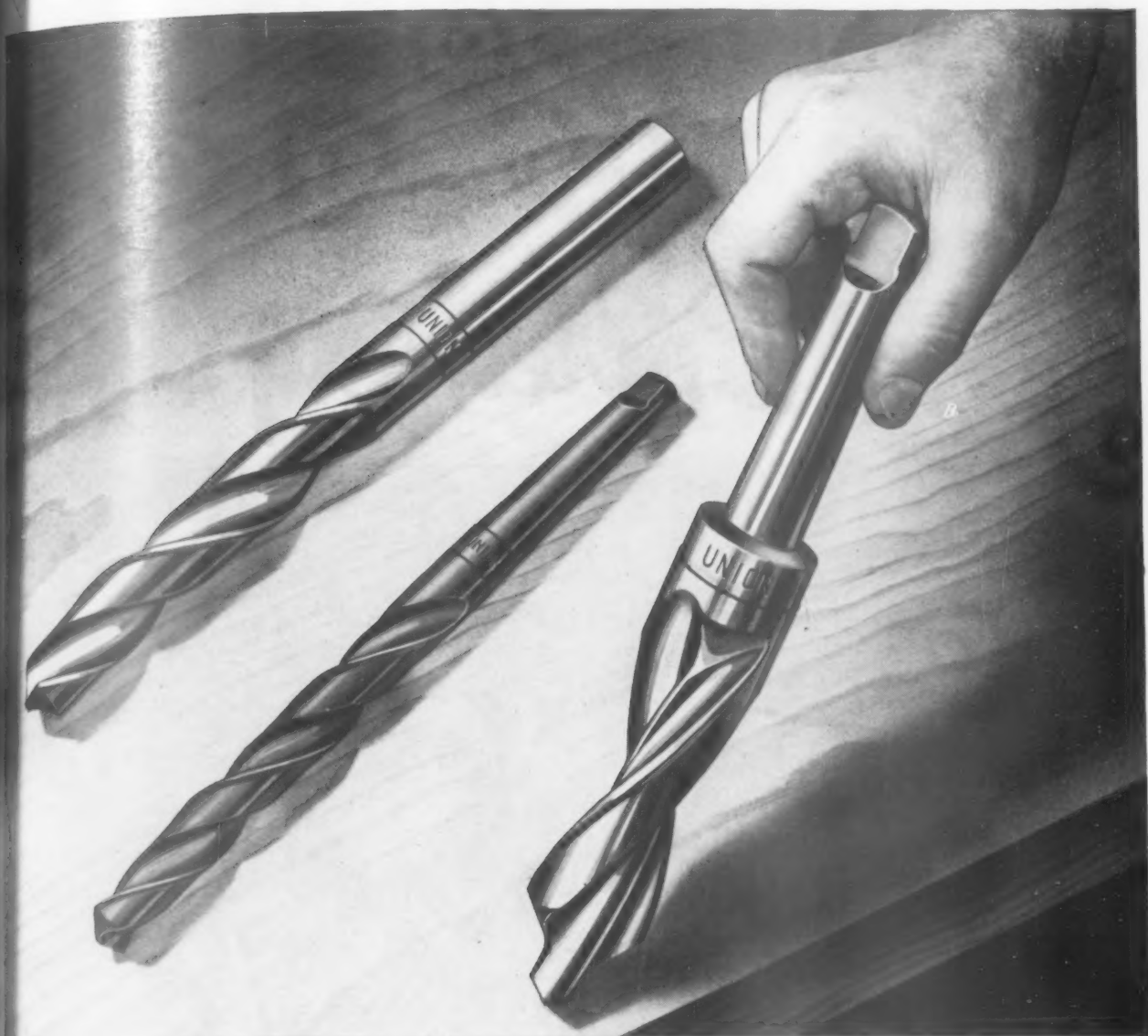


ALFING

Model BK-25 Heavy Duty Right Drill. Power feed. Spindle speeds (8): 45-500 RPM. Force-feed lubrication. Motor drive.

MOREY
...for more value!

MOREY MACHINERY CO., INC.
Manufacturers • Merchants • Distributors
410 BROOME ST. • NEW YORK 13, N.Y.
TELEPHONE: CANAL 5-7400
CABLE ADDRESS: WOODBOK, N.Y.



WHICHEVER TYPE YOU CHOOSE, you're sure of accurate, fast-cutting, long-lasting performance when you choose Union Twist Drills.

Union Straight Shank Drills come in carbon steel (No. 110) and high speed steel (No. 510) in 89 diameters from $\frac{1}{8}$ " to 2". *Union Heavy Duty Taper Shank Drills* come in high speed steel (No. 370) in 81 diameters from $\frac{1}{4}$ " to 1 $\frac{1}{2}$ ".

Union Sub-Land Drills are specials made of high speed steel and are designed for drilling holes of two or more diameters in one operation.

The margin of each step is continued the full length of the flute so that these drills, by repeated sharpening, can be used the entire length of the fluted section.

*no other twist drill
will outperform a*

UNION



contact your local distributor

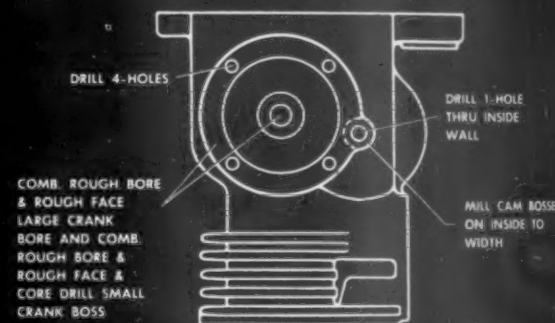
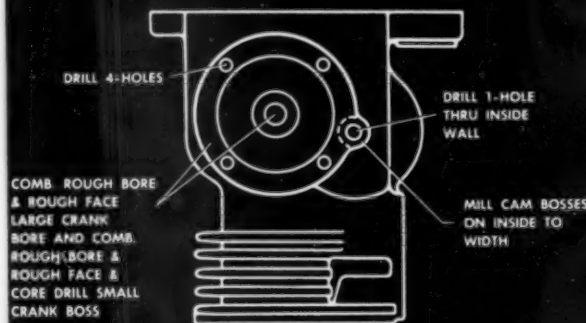
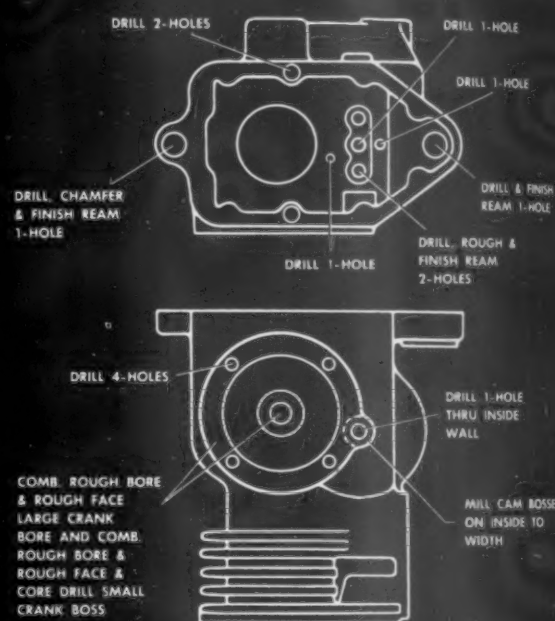
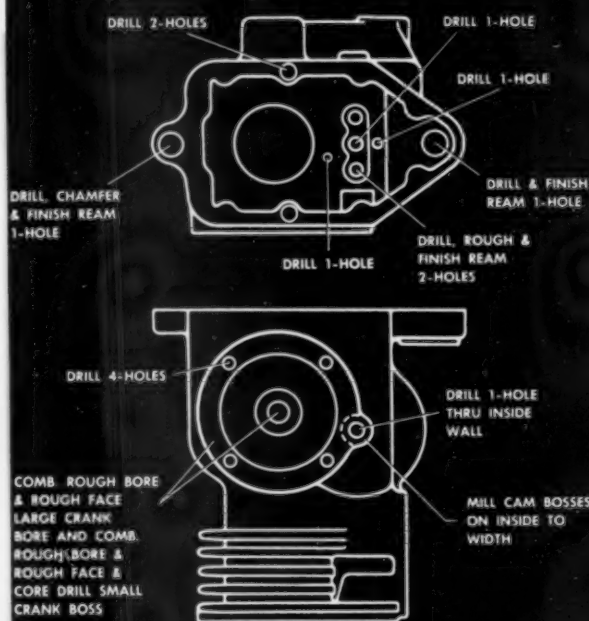
UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS



We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass. Taps, Dies, Screw Plates . . . BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers . . . BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates.

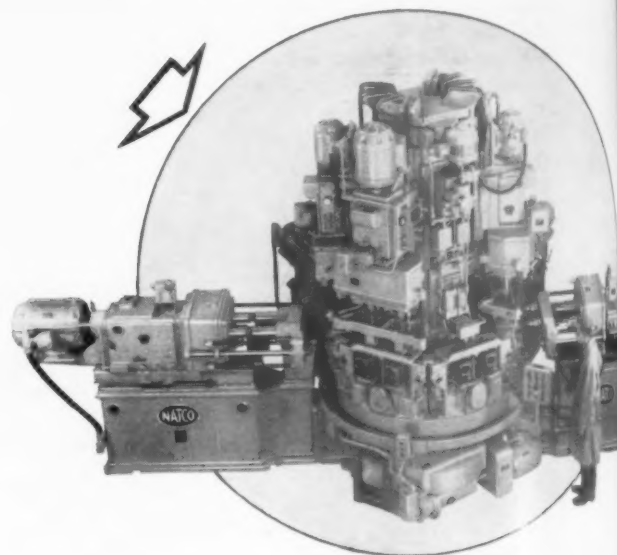


15 years of
sold 4 New
Increasing Engine



PRODUCTION: 180 Engine Blocks per hour (on eight types of blocks) OPERATIONS:

- POSITION #1** Remove and load two parts.
- POSITION #2** *Vertical Unit*
Drill 1 hole for $\frac{1}{2}$ " diameter ream.
Drill 1 hole $\frac{1}{16}$ " diameter.
Drill 1 hole $\frac{1}{16}$ " diameter.
Drill 1 hole for $\frac{1}{16}$ " diameter ream.
- POSITION #3** *Vertical Unit*
Drill 2 holes $\frac{7}{32}$ " diameter.
Drill 2 push rod holes.
Horizontal Unit
Combination rough bore large crank bore and rough face large and small crank bosses
- POSITION #4** *Horizontal Unit*
Mill cam bosses on inside.
- POSITION #5** *Vertical Unit*
Rough ream 2 push rod holes and chamfer one hole for $\frac{1}{2}$ " diameter.
Drill oil hole $\frac{3}{16}$ " diameter.
Horizontal Unit
Drill one hole.
- POSITION #6** *Vertical Unit*
Finish ream 1 hole to $\frac{1}{16}$ " diameter.
Finish ream 1 hole to $\frac{1}{2}$ " diameter.
Finish ream 2 push rod holes.
Horizontal Unit
Drill 4 holes for $\frac{1}{4}$ "—28 tap.
Drill 1 hole.

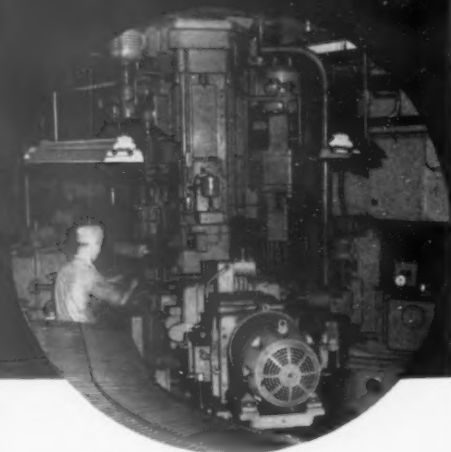
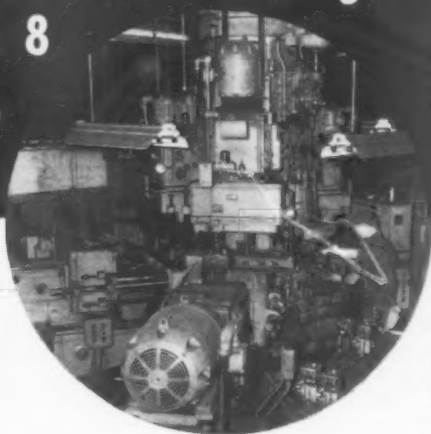
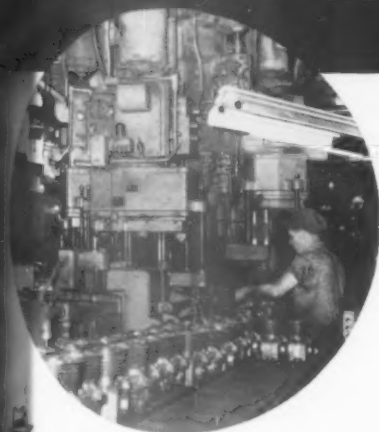


of profitable operation NATCO MACHINES Block Production 150%

These original NATCO
MACHINES installed in
which produced 120
blocks per hour...



The manufacturer has now added
these 4 NEW NATCOS increasing
production 150% on 8
different types of blocks



These four new NATCO Station Type Machines each produce 180 engine blocks per hour on eight different types of blocks. Operation of the first new machine, shown at the left below the photograph, is typical of the entire line of new NATCO'S. **Another product made better, faster and at lower cost with NATCO Engineering.**

Call a Natco Field Engineer

to help you solve your problems in
Drilling, Tapping, Boring and Facing



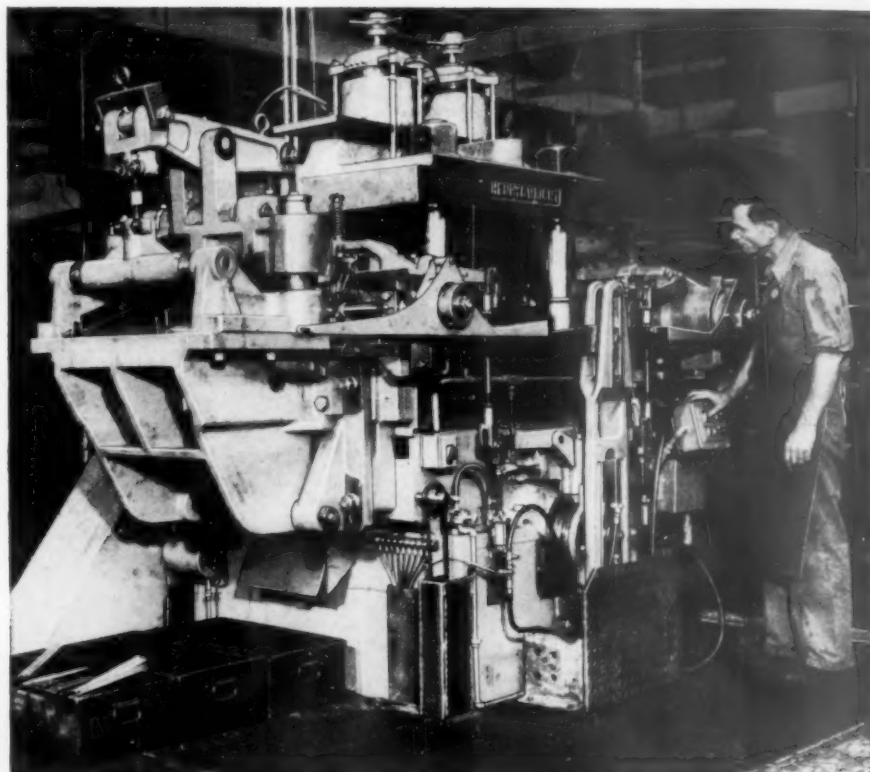
Branch Offices

1809 Engineering Bldg., CHICAGO • 409 New Center Bldg., DETROIT
1807 Elmwood Ave., BUFFALO • 2902 Commerce Bldg., NEW YORK CITY

NATIONAL AUTOMATIC TOOL COMPANY, INC. Richmond Indiana

H & W Dieing Machines

many more pieces at much less cost



New, Bigger Dieing Machine is producing 4500 pieces per hour for Hart & Cooley Mfg. Co. This new 200-ton machine features all of the basic Henry & Wright design principles:

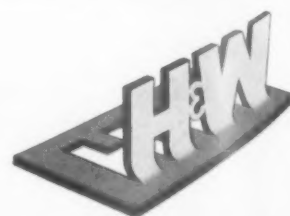
- Flywheel, crankshaft and connection are below the punchholder instead of above.
- Low center of gravity for high speed with minimum vibration.
- Punch is pulled, not pushed.
- Maximum guiding surface — four post guide for punchholder.
- Upper crosshead takes only the pressure necessary to perform work in die — no crankshaft thrust.

Only the best is good enough



FACT PACKED CATALOG

Complete descriptions of all Henry & Wright Dieing Machines. Write: Henry & Wright, 471 Windsor St., Hartford 5, Conn.



HENRY & WRIGHT
Division of Emhart Mfg. Co.

POPE

LEADS THE PRECISION SPINDLE PARADE



Specify POPE whatever the Spindle application, type or size,

— for continuous, peak production of accurate parts with finely and uniformly finished surfaces.

— for cool operation at high speeds over long periods. The POPE System of lubrication requires no further addition or attention for the operating life of the bearings.

Tell us about the job so we can recommend the right Spindle and give you price and delivery estimates.

No. 83

POPE

TRADE MARK REG. U.S. PAT. OFF.

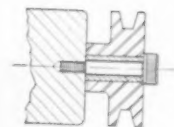
POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS
BUILDERS OF PRECISION SPINDLES

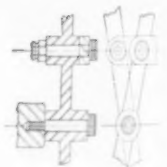


UNBRAKO® Shoulder Screw Applications



**1. Stationary
Shaft or Pivot**

- A. Idler pulley
- B. Idler gear
- C. Circular form tool
- D. Lever, crank or linkage arm
- E. Cam
- F. Latch



**2. Moving
Shaft or Pivot**

- A. Linkage bar connection
- B. Cam
- C. Cam follower
- D. Ratchet
- E. Planetary gear or pinion

UNBRAKO SHOULDER SCREWS...

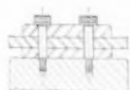
uniform, standardized, precision threaded

industrial fasteners...HAVE NUMEROUS APPLICATIONS

You can use these UNBRAKO Socket Head Shoulder Screws as stationary shafts or pivots, moving shafts or pivots, stationary guides, and for stripper plate and pressure pad applications. These UNBRAKO screws have

shoulders held to close tolerances, finished threads close to the shoulder, and threads and heads concentric with the body. Write for descriptive literature. STANDARD PRESSED STEEL Co., Jenkintown 37, Pennsylvania.

UNBRAKO SOCKET SCREW DIVISION



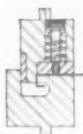
3. Stationary Guide

- A. Locating pin in jigs and fixtures
- B. Latch stop
- C. Alignment of stationary members
- D. Linkage block
- E. Grooved cam
- F. Adjusting block



4. Stripper Plate Uses

- A. Blanking dies
- B. Compound dies
- C. Progressive compound dies
- D. Drawing dies
- E. Redrawing dies
- F. Piercing and shearing dies
- G. Combination blanking, drawing and piercing dies
- H. Double action blanking and drawing dies



5. Pressure Pad Uses

- A. Cutting-off dies
- B. Bending dies
- C. Bending and forming dies
- D. Assembly dies
- E. Double action blanking and drawing dies

SPS
JENKINTOWN PENNSYLVANIA

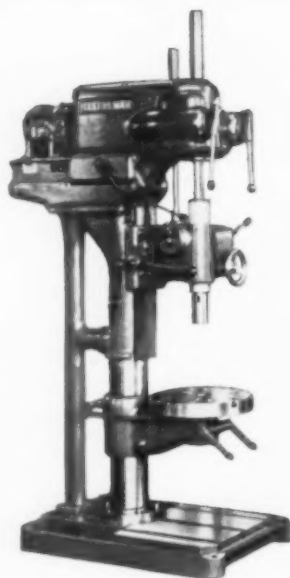


THE

CLEEREMAN

LINE

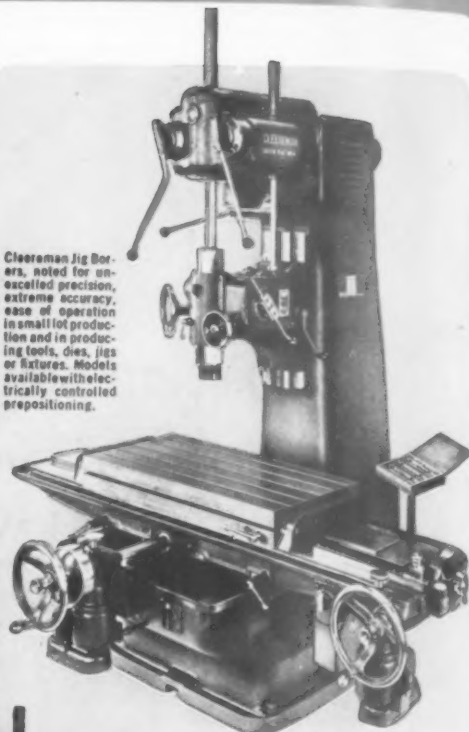
OF PRECISION JIG BORERS and DRILLING MACHINES



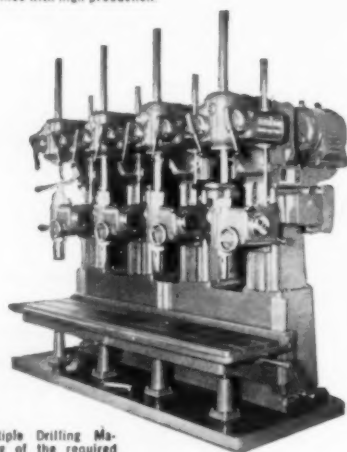
Cleereman Model 325 Single Unit Sliding Head Drilling Machines combine extreme sensitivity with rugged construction, are extremely versatile and may be used for production drilling and tapping.



Cleereman Jig Borer, noted for unexcelled precision, extreme accuracy, ease of operation in small lot production and in producing tools, dies, jigs or fixtures. Models available with electrically controlled prepositioning.



Cleereman Round Column Drilling Machines produce accurate holes at high speed and at low cost and are general purpose machines with high production.

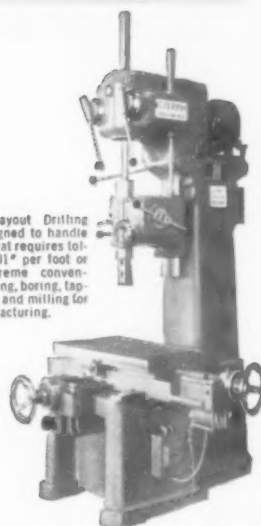


Cleereman Multiple Drilling Machines consisting of the required number of machines of any of the three types supplied to meet individual requirements.

Cleereman Box Column Drilling Machines have an exceptionally rigid construction for continuous heavy duty work combined with accuracy and the speed required for low cost production.



Cleereman Layout Drilling Machine designed to handle layout work that requires tolerances of .001" per foot or broader. Extreme convenience for drilling, boring, tapping, reaming and milling for jigless manufacturing.



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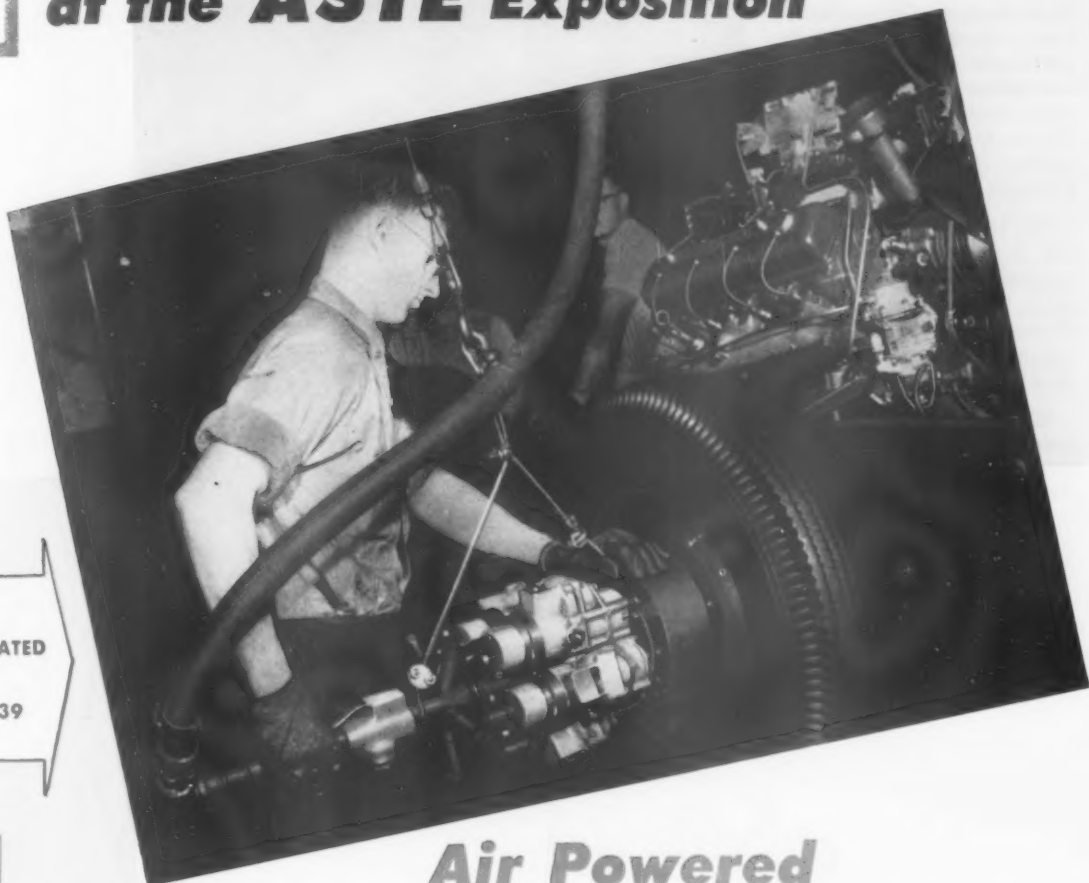
CLEEREMAN MACHINE TOOL CO. Green Bay, Wis.

BUILDERS OF PRECISION JIG BORERS & DRILLING MACHINES



presents...

at the ASTE Exposition



SEE IT
DEMONSTRATED
IN
BOOTH 1639



MULTIPLE NUT RUNNERS
give you:

2 or more nuts driven
at once . . . in the time
formerly required to
drive one.

Good "quality control"
. . . Torque is uniform
on each and every nut.

Safe Operation for op-
erator . . . Torque reac-
tion is non-existent.

Immediate on-the-job op-
eration . . . No special
training needed for the
operator.

Low Maintenance . . .
Units in service show
maintenance savings up
to 50%.

Air Powered **MULTIPLE NUT RUNNING** **with "Quality Control"**

For years multi-spindle machines have saved time and dollars . . . Now you can tool up for *multiple savings* with Ingersoll-Rand Multiple Nut Runners.

This latest and most important development in the field of production will be displayed and demonstrated at the ASTE Exposition in Chicago, March 17-23. Don't pass up this opportunity to get the complete story on this and many other advancements in the field of Air and Electric Tools—also Air Compressors.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

742-8

March, 1952

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-227

227

... How to uncover Extra

Most tool engineers today know the advantages of using Self-tapping Screws. This one-operation fastening saves time needlessly lost tapping for machine screws, molding inserts in plastics, bolting, riveting, or soldering.

But they still may be missing some substantial *extra* savings, because all Self-tapping Screws are not alike. *Planned* savings don't always *pay off* — unless you specify "P-K".

When Parker-Kalon developed the *first* Self-tapping Screws, nearly 40 years ago, they learned how to maintain, in every screw, the uniform hardness and toughness, the sharp threads and accurate size, the consistent dependability that keeps assembly humming. That's why every screw in every box can be *guaranteed* first quality.



P-K SELF-TAPPING SCREW BULLETIN, 48 pages, describes all types, tells where and how to use what screw, shows typical applications. **P-K ENGINEERING STANDARDS**, 48 pages, gives standard head and thread dimensions of all P-K Screws, other useful data. Free on request.

PARKER-KALON

The Original **SELF-TAPPING SCREWS**

Cold-forged **SOCKET SCREWS**

AND OTHER FASTENING DEVICES

The Tool Engineer

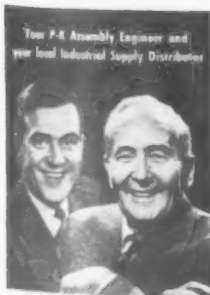
Savings in tool assembly

P-K Socket Screws are favored by most shop men because they like the special P-K features that save time and trouble on the job, and make a better assembly.

In Socket Head Cap Screws, only P-K gives you **SIZE-MARK** and **GEAR GRIP**. The size is clearly incised on the head, can be seen at a glance. It saves time and wasted screws when sizes get mixed up, prevents errors by green help. Maintenance men like it, too — it helps them in reassembling.

In Socket Set Screws, P-K gives you **GROUND THREADS**. Threads are ground on hardened blanks. Smooth, bright, burr-free finish makes them easier to handle, assures uniform Class 3 Tolerance.

Ask for samples — see why P-K Socket Screws take top honors in any test.



Teamed Up to help you Step Up assemblies

The P-K Assembly Engineer is a fastening expert, fully qualified to help you plan faster, better, lower cost assemblies.

Your local Industrial Supply Distributor is an expert in procurement, with complete experience and facilities for simplifying your supply problems. Let them help you.

PARKER-KALON CORPORATION, 200 VARICK ST., NEW YORK 14

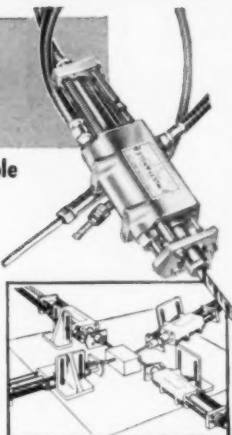
P-K SOCKET SCREW BULLETIN, 16 pages, describes all types, and illustrates quality-control back of P-K guarantee. **SOCKET SCREW DIMENSION FINDER**, a pocket-size plastic slide chart, gives all essential dimensions of all types. Free on request.

PRODUCTION *UP*
COSTS *DOWN*
 WITH
Commander
PRODUCTION TOOLS

**MULTI-ANGLE
DRILL UNIT**

- Quick, easy set-ups for Multiple Drilling of angle holes
- Complete Drilling Unit—Full 4" Stroke

MULTI-ANGLE Drill Units provide unlimited freedom of set-up for long or short run multiple hole drilling jobs. May be mounted on fixtures, jigs or bolted to drill press table. Save time, cut costs on angle drilling. Used with any drill press or suitable power source.



DRILLING COOLANT TABLE

- Complete Coolant System Contained in Precision Ground Drill Press Table
- 1 to 8 nozzles ... easily positioned
- Table always square with Spindle



Drilling Coolant Table is complete with pump, motor, reservoir and nozzles ... provides plenty of coolant where and when you want it. Leveling device assures squareness with spindle.

**Adjustable
MULTI-DRILL**

- Adjustable To Any Hole Pattern
- Drill 2 to 8 Holes at 1 Stroke
- Fits Any Drill Press

Increase production up to 800%—save time, cut costs. Mounted without alterations or special tools. 9" drilling area; centers to 1/2". Extension Spindles available to increase area to 22 1/2". Special adaptations available.

MODEL 900

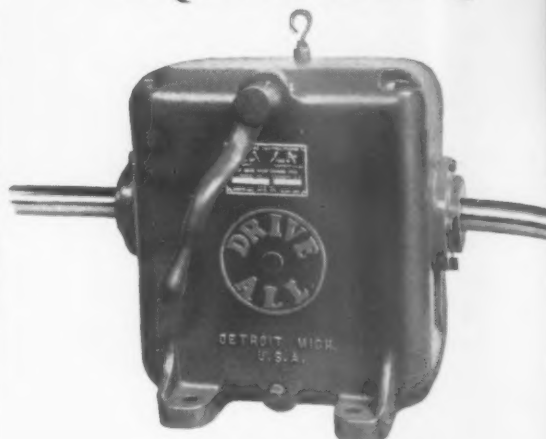
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 Commander Distributor

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**MACHINE DRIVES
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REDUCERS**

1/4 to 30-HP Capacity Standard Models
 Others can be designed to your specifications
 Many time-saving mounting brackets available

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**NEW OPTICAL METHOD
GUARANTEES PRECISION**

**USE THE LEITZ
PROJECTION
ORTHOMETER**

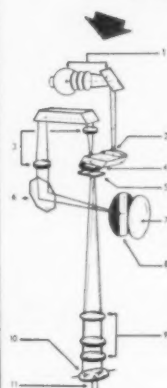
"It's Optical Measuring"

The absence of mechanical or electronic parts assures superior accuracy and reliability since the optical method is practically unaffected by heat, wear of parts, backlash, etc...

This LEITZ ORTHOMETER speeds up inspection, allows more than one person to view scale simultaneously. The only moving parts are the contact tip and mirror.

One graduation represents 50 millionths.

Guaranteed accuracy over full range of 200 graduations (.010") is .00001".



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The Tool Engineer

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ACCURATELY SHARPENED
CUTTING TOOLS WILL

*cut costs as
well as metal*



Operation of P&W CUTTER & RADIUS GRINDERS

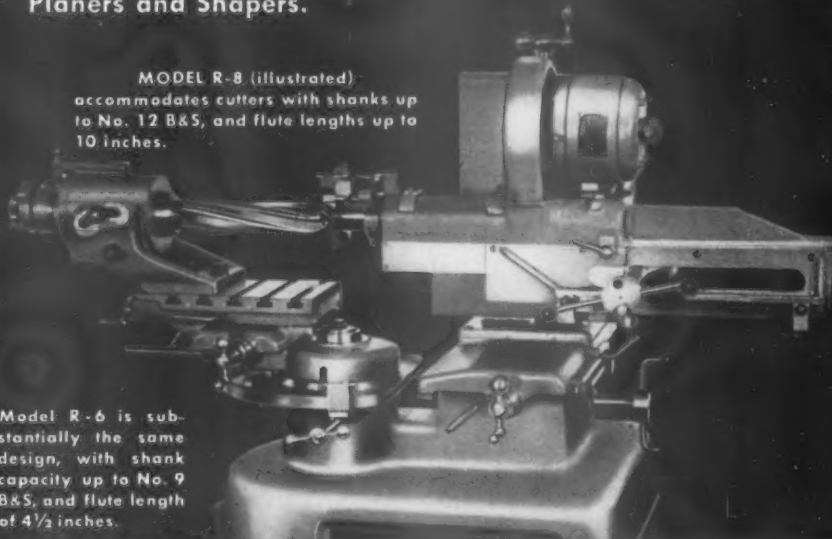
is simple. Their performance will save \$\$ in any Die Shop or Toolroom — save more \$\$ in Production Departments by increasing the productive life of Cutters—and save still more \$\$ in the Grinding Department by paying for themselves in short order. Get full details from any P&W Branch Office.

SAVE \$\$\$ — AND DO A BETTER, MORE ACCURATE JOB WITH PRATT & WHITNEY CUTTER AND RADIUS GRINDERS

This versatile Machine is designed for efficient, economical sharpening of End Mills, Keller Cutters and their corresponding Tracers, and Die Sinking Cutters — stock or special. It assures exact radii for ball and radius nose cutters . . . tangential blends . . . uniformity of flutes whether cylindrical or tapered . . . concentricity with shank (therefore with spindle) . . . and provides Cutters that cut cleanly, smoothly, at the most profitable speeds. Due to the versatility inherent in its design it also sharpens Side or Face Milling Cutters, Form and Thread Milling Cutters and Form Tools for Lathes, Planers and Shapers.

MODEL R-8 (illustrated)
accommodates cutters with shanks up
to No. 12 B&S, and flute lengths up to
10 inches.

Model R-6 is substantially the same
design, with shank
capacity up to No. 9
B&S, and flute length
of 4½ inches.



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means **HIGH
PRODUCTION**
and

HIGH EFFICIENCY
in the Tool Room

QUICK, ACCURATE STOCK KEEPING
No time lost in opening boxes for inspection. Complete labelling makes it easy to keep like taps together.

NON-SPILL BOXES
Unique construction of HY-PRO box makes it easy to handle. Tension tabs on non-spill drawer hold cover securely and prevent spilling. Finger-hole in cover overcomes tension when pulling out drawer.

AUTOMATIC INDICATORS
For time-saving inventory, tension tabs can be marked and left standing when box is partially used.

HY-PRO has complete facilities for producing Special Taps exactly to your specifications. Our engineers will gladly study your special tapping problems and make recommendations, with quotations. Send us complete information. Ask to receive our bi-monthly HY-PRO stock list of Special Taps. Many special and standard taps are in stock for prompt delivery.

HY-PRO TOOL CO.
A subsidiary of Continental Screw Co.
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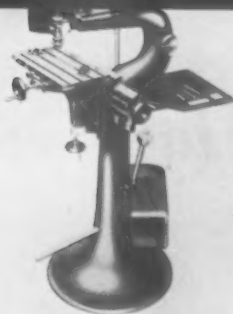
REG. U.S. PAT. OFF.
**HY-PRO
TAPS**



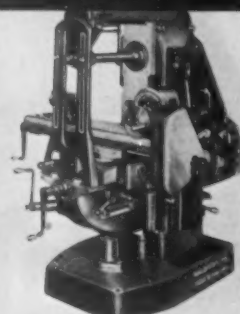
Allen & Wade Model E24
3" Arm, 14" Column, 3" Capacity



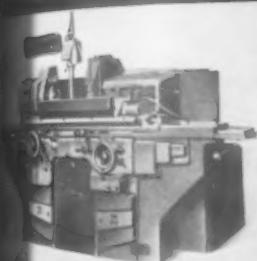
Colchester 15" x 48" All Geared
Head Turret Lathe



Taylor-Hobson Model CX
Engraving Machine



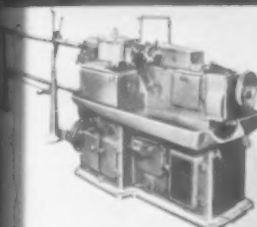
Richmond No. 03SD Univers
Milling Machine



Jones & Shipman Fig. 1001 ENB4
Cylindrical Grinder 10" x 27"



Lang 20" x 76" Heavy Duty
Geared Head Engine Lathe



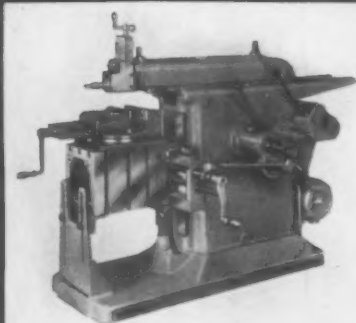
CVA No 20 1 1/4" Capacity Single
Spindle Automatic Screw Machine



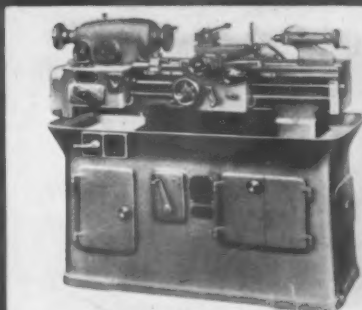
Jones & Shipman Fig. 310 6" x 18"
Tool and Cutter Grinder



Timbrell & Wright No. 3NS
2" Capacity Turret Lathe



Brook 18" High Speed Shaper



Smart & Brown Model "A"
9" x 20" Precision Toolroom Lathe



Richmond No. H83/12 4 1/2 Ft.
Arm 12" Column 1 3/4" Capacity



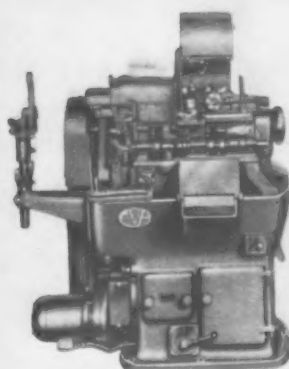
Pacera Model A10 3/4" Capacity
Articulated Radial Drill Press

BRITISH MACHINE TOOLS ON DISPLAY

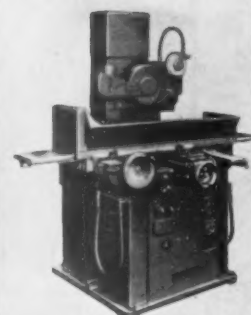
BOOTH 1205



BRITISH INDUSTRIES CORPORATION



CVA No. 8 1/2" Capacity Single
Spindle Automatic Screw Machine

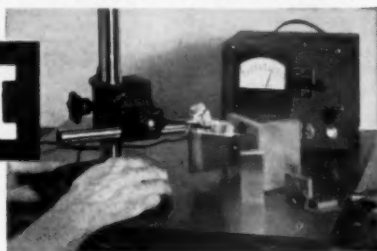


Jones & Shipman Fig. 1011
x 27" Hydraulic Surface Grind

**For All-Around Shop Gaging
with LABORATORY PRECISION**

INDI-AC

**Electronic
Indicator**



VERSATILE! Checks set-ups and runout, *on the machine*. Reaches ID's and remote surfaces—with meter located for convenient reading. Ideal for surface-plate work. Thoroughly proven in shops, tool rooms and gage rooms.

SENSITIVE! Reads .0005" and .00005"—or .0001" and .00001"—per division, either side of zero, on continuous linear scales. Both scales always give same reading.

DEPENDABLE! Frictionless movement and freedom from drift assure **CONSISTENT REPEAT READINGS**.

FAST! Instantaneous meter response permits fast readings—dependable runout measurements.

FREE INDI-AC BULLETIN
Gives Full Details. Write for it!

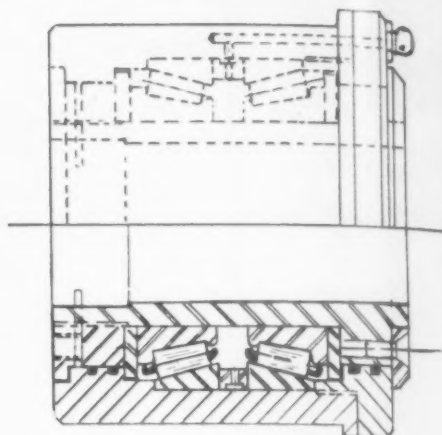


AND ASK about the MICRO-AC Electronic Micro-comparator (reads in millionths); PAR-AC Electronic Production Gage.

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**JERGENS
ROLLER BEARING
Pilot Bushings**



Large industrial users find the Jergens Pilot Bushing keeps machines working and earning, with notable freedom from "down time", from tool breakage and product waste . . . Sealed against dust and grit, with extreme accuracy as specified, plus adjustability for wear, the Jergens Pilot Bushing is abolishing tool chatter and improving precision in a great number of applications . . . Equipped with Timken Precision Roller Bearings. See us at Space 743 Chicago Machine Tool Show.

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SAVE IN YOUR OWN PLANT

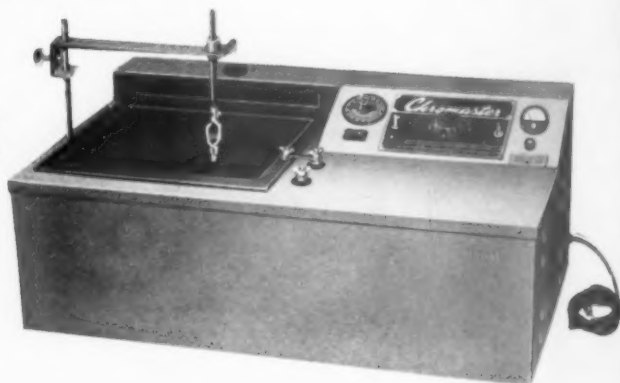
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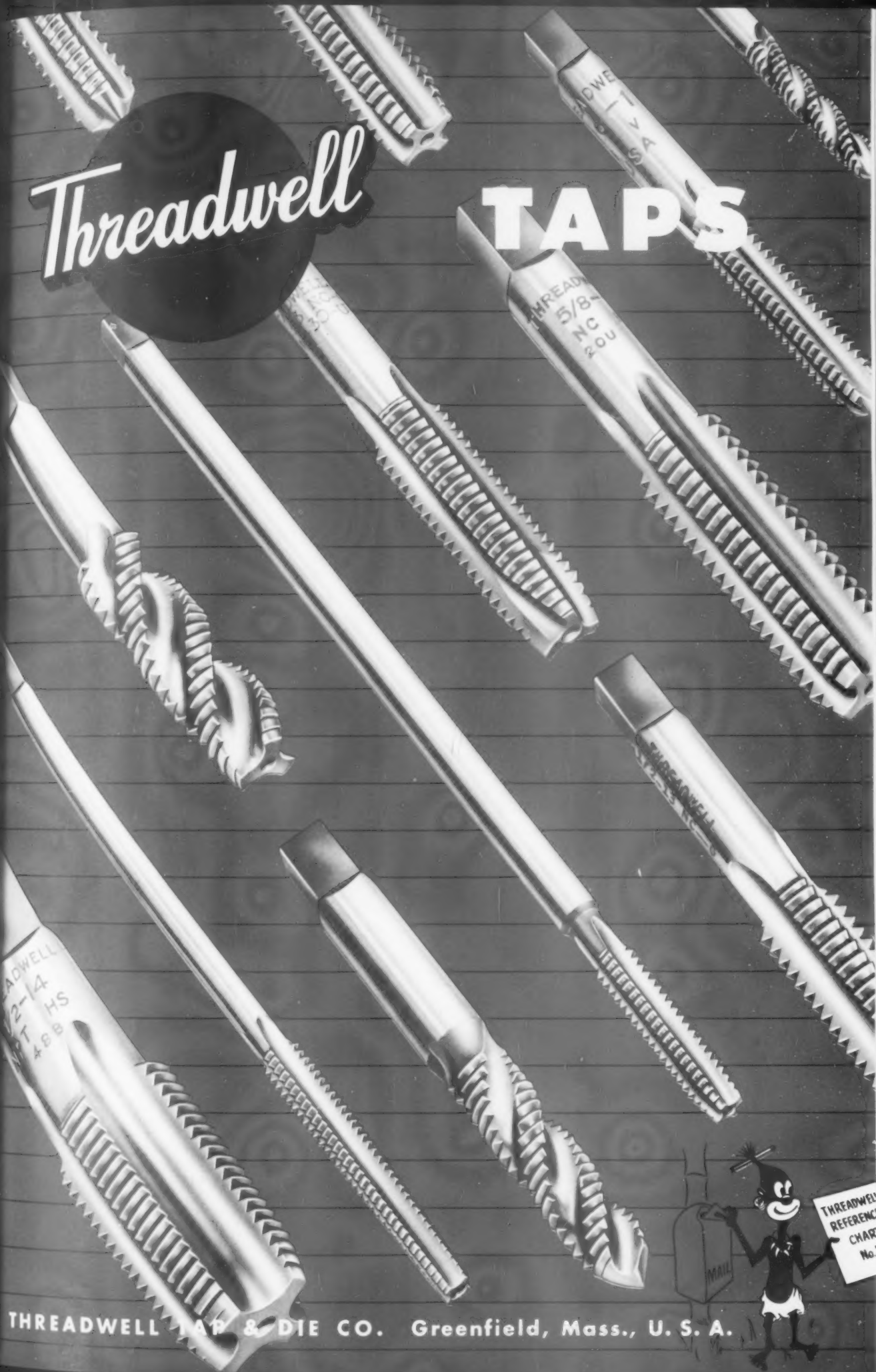
INDUSTRIAL CHROME DIVISION

WARD LEONARD ELECTRIC CO.

MOUNT VERNON, NEW YORK

Threadwell

TAPS



THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

TABLE OF SPEEDS Fractional Size Taps

Diam. Inches	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
Feet per Min.	REVOLUTIONS PER MINUTE												
20	306	245	204	175	153	122	102	88	77	68	61	56	51
25	383	306	255	219	191	153	128	109	96	85	77	69	64
30	458	367	306	262	229	183	153	131	115	102	92	83	76
35	535	428	357	306	268	214	179	153	134	119	107	97	89
40	611	489	407	349	306	244	203	175	153	136	122	111	102
50	764	611	509	437	382	306	255	218	191	170	153	139	127
55	841	673	560	480	420	336	280	240	210	187	168	153	140
60	917	733	611	524	458	367	306	262	229	204	183	167	153
65	993	795	662	568	497	397	331	284	249	221	199	181	166
70	1070	856	713	611	535	428	357	306	267	238	214	194	178
80	1222	978	815	698	611	489	407	349	306	272	244	222	204
90	1375	1100	917	786	688	550	458	393	344	306	275	250	229
100	1528	1222	1019	873	764	611	509	436	382	340	306	278	255
110	1681	1345	1120	960	840	672	560	480	420	373	336	306	280
120	1833	1467	1222	1048	917	733	611	524	458	407	367	333	306
130	1986	1589	1324	1135	993	794	662	568	497	441	397	361	331
140	2139	1711	1426	1222	1070	856	713	611	535	475	428	389	357
150	2292	1833	1528	1310	1146	917	764	655	573	509	458	417	382

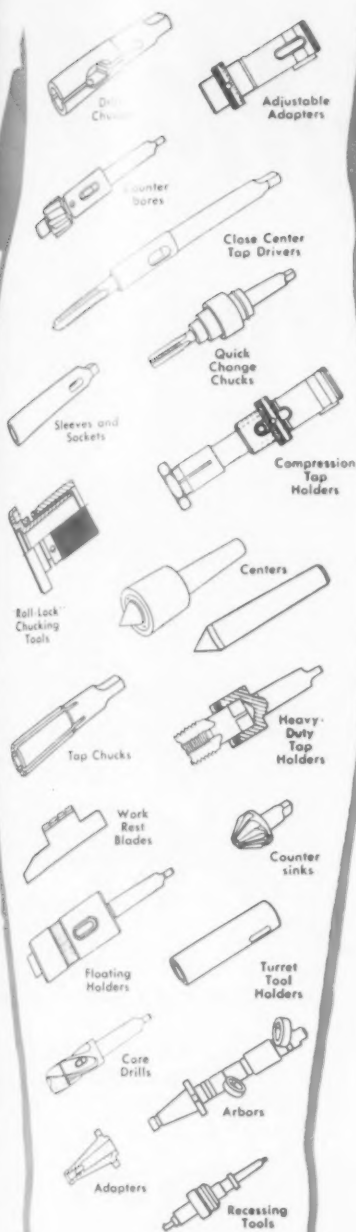
Threadwell

Threadwell Tools
do many jobs



they can
do your
tough ones

THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.



the "ARMS and HANDS" for your MACHINE TOOLS

If you think of a Lathe, Mill, Multi-Spindle Machine, or other Machine Tools as being a human body, supplying power to the parts of the body doing the actual work, then Scully-Jones tools represent the "Arms and Hands".

NEW DRILL STOP

...a positive control for depth of hole

by **SJ** SCULLY JONES

End Guesswork and Reduce Rejects:

You often require close control of depth for operations — as in center drilling, drilling and reaming — on turret lathes, radial drills and other machines. On these operations, or wherever a quick change arrangement is used in one station for sequence operations, you hold uniform hole depth by using the new S-J Drill Stops. They provide a positive stop which ends guesswork and reduces rejects.



Quick and Easy to Insert, Remove and Adjust Tools:

Simply loosen set screw and slip stop collar from threaded shank for quick insertion or removal of taper shank tools. The threaded lock bushing provides quick and accurate adjustment of the stop collar. Only a quarter turn of the set screw forces the bushing against the shank threads for a positive lock.

Write for
BULLETIN NO. 18-50
for data
on Drill Stops.



Work on Close Centers:

The small body diameter permits you to operate these Drill Stops on close centers and near shoulders or other obstructions.

Trouble-Free Performance:

S-J Drill Stops are made from an alloy steel with all points of wear hardened for long life. The four chip grooves tend to break up and remove any chips from the surface on which it stops. Investigate the use of S-J Drill Stops wherever you require a positive control for depth of hole. Made in 8 sizes having Morse Taper shanks and holes.

Scully-Jones
AND COMPANY

1915 S. Rockwell St., Chicago 8, Ill.

YOU GET LOW COST FAST ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

A YEAR-ROUND "TOOL SHOW"

You can see the S-J Standard Tools (sketched in the column at the left) on display or in operation the year-round, at the Scully-Jones plant. For year-round reference too, you'll find complete information on these and other tools, in the S-J Catalog 600—yours on request, on your company letterhead.

These "arms and hands" — as we like to call them — will help you equip your machine tools for low cost, fast, accurate production.

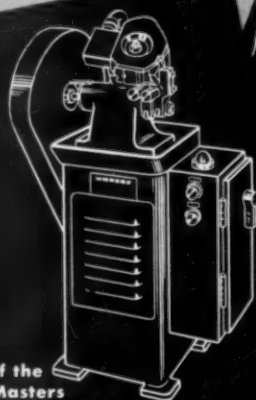
Whether you select Scully-Jones Standard or Special Tools you can be confident of getting the best that can be produced — the result of 40

years' experience, engineering research, modern equipment, correct materials and expert workmanship. Recently Scully-Jones manufacturing facilities have been further expanded to give you more reasonable deliveries.

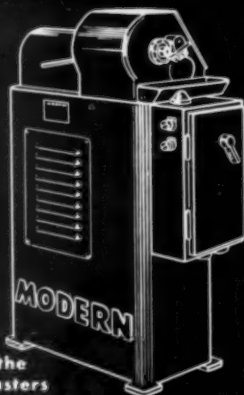
Whenever your tooling problems or design programs require outside service, S-J Engineering and Design Service has "heads and hands" to help you. Whether large or small, let us discuss your engineering problems and design programs.

For quick action see the nearest Scully-Jones representative or contact us direct.

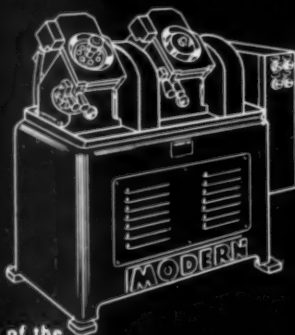
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BOOTH 1102
ASTE INDUSTRIAL
EXPOSITION
CHICAGO,
MARCH 17-21



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for helical gears



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One of the
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a Burr-Master for hypoids!

*New!
Fast!
Universal!*

MODERN does it again!

Chamfers profile and part of root on both toe and heel of all hypoid pinion teeth; also chamfers peripheral chamfer on large end—all in one operation!

UP to 300 pinions per hour per station!

Foolproof electric gaging; no clamping, no pre-locating.

No coolant, air or hydraulic mechanism!

Quick-change tooling for different pinion tooth numbers and diameters.

SEE THE MODERN BURR-MASTERS IN OPERATION AT THE ASTE SHOW

Machine illustrated: Triple-head Modern Burr-Master for chamfering up to 900 hypoid pinions of different tooth numbers per hour. (Patents Pending)

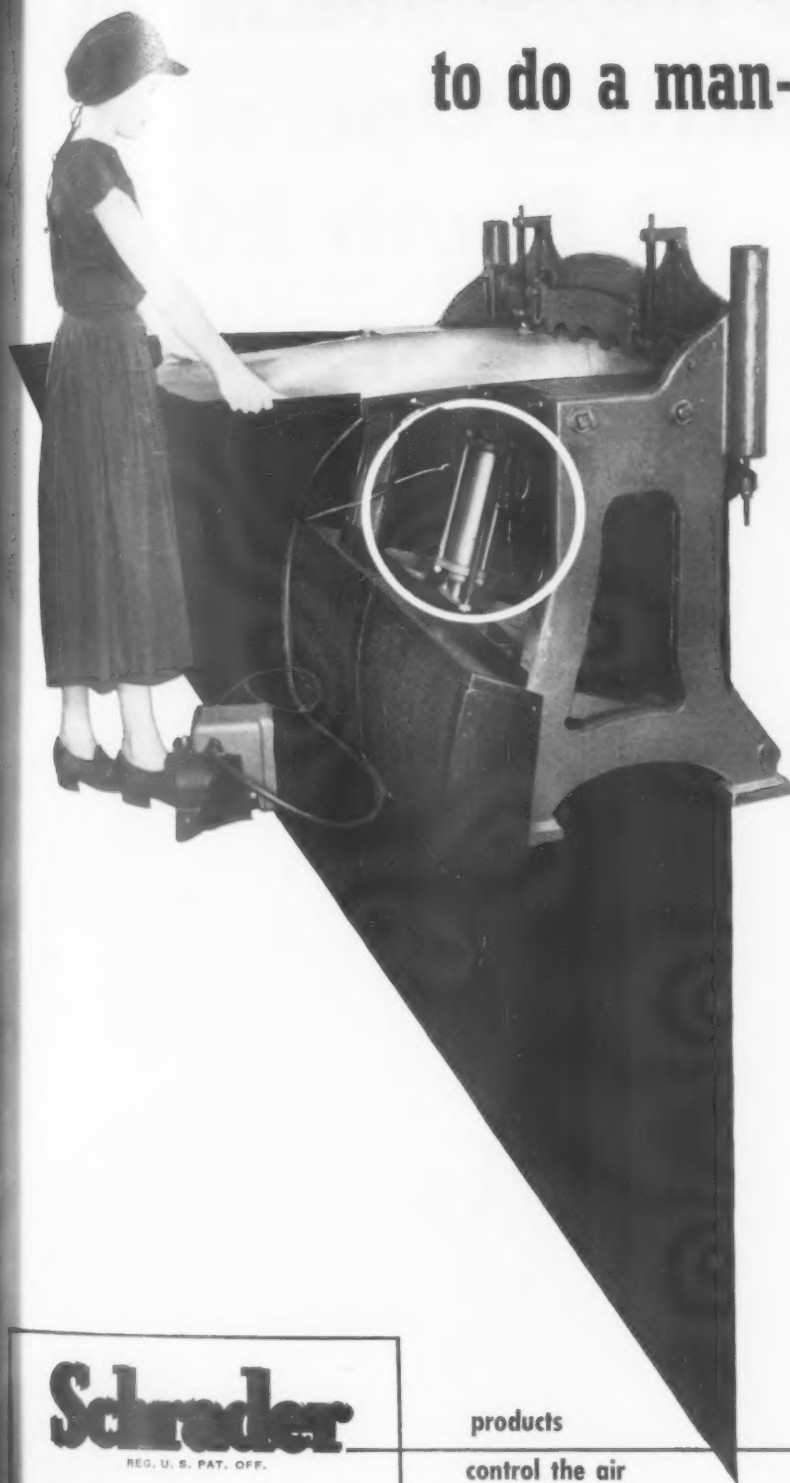


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Industrial Engineering Co.

DESIGNERS AND MANUFACTURERS OF PRECISION BUILT TOOLS
14230 BIRWOOD AVE. • DETROIT 4, MICHIGAN

It doesn't take a heavyweight to do a man-sized job



Before these shears were shifted to air operation the entire weight of a man was required on the foot treadle to cut the sheet metal.

All this is changed now. A light touch of the girl's foot on the pedal puts all the power of the Schrader Air Cylinder to work, sending the knife-edge through the metal.

This is just one example of how air cylinders can speed up production and reduce fatigue . . . one of many hundred applications of Schrader cylinders and valves. You can undoubtedly find many places in your shop where manual lifting, lowering, pushing or pulling is slowing up production.

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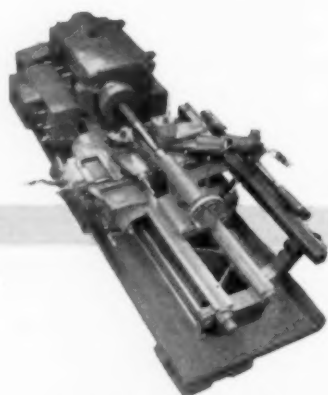
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Name.....Title.....

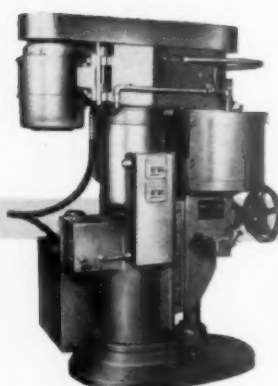
Company.....

Address.....

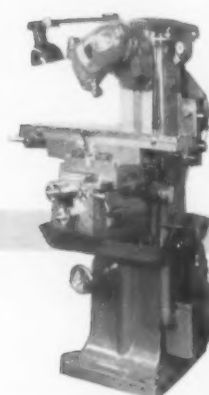
See these machines in Actual Operation at Booth 2025 ASTE Industrial Exposition March 17-21



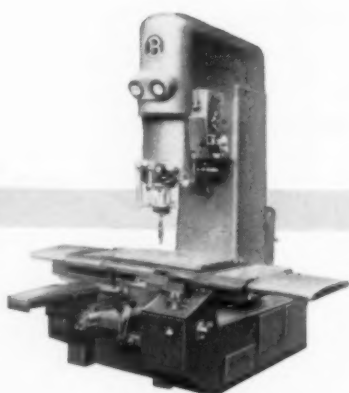
SCHAERER LATHE
WITH HYDRAULIC
TRACER CONTROL



DISKUS SURFACE
GRINDER TYPE DV300



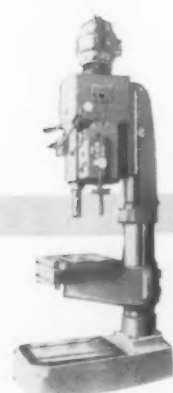
KOCHER SCHEIDT
PRECISION AND
PRODUCTION MILLER
SIZE 2, 3, 4, AND 5



HY-OP 51 OPTICALLY
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FAMO DOUBLE
END GRINDER
FOR CARBIDE TOOLS



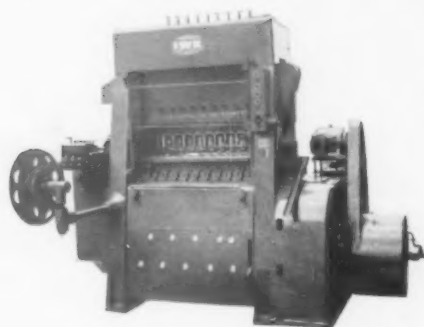
PARABO HEAVY DUTY
DRILL WITH
AUTOMATIC TAPPING
ARRANGEMENT



M.B.I. Export & Import Ltd.

475 GRAND CONCOURSE, BRONX 51, NEW YORK

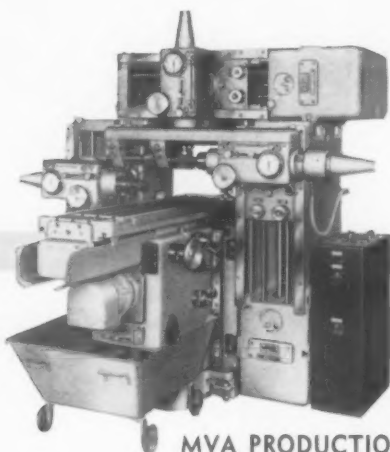
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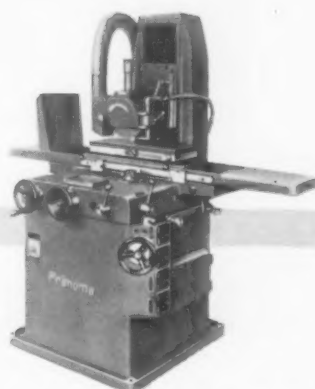
1WK MULTI-STAGE
PRESS
6 TO 10 COMBINED
OPERATIONS



FAMO DOUBLE
END GRINDER
WITH BUILT-IN
DUST COLLECTOR



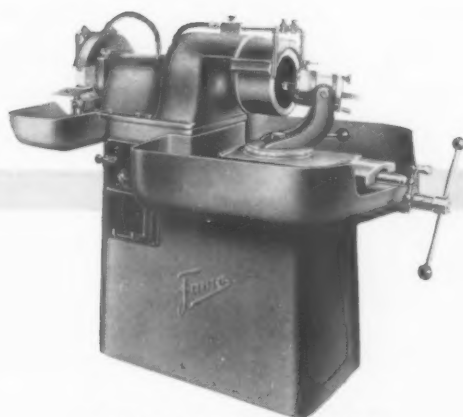
MVA PRODUCTION
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FAMO CARBIDE GRINDER
FINISH CARBIDE TOOL BIDS
WITHOUT DIAMOND WHEEL



PARABO HEAVY DUTY
DRILLING MACHINE

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FRONT SIDE OF TOOLING AREA 1 1/2-SIX



REAR SIDE OF TOOLING AREA 1 1/2-SIX

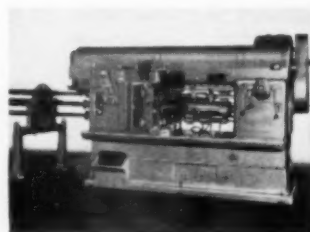


THE IMPORTANT REQUIREMENT

All brands of multiple spindle bar automatics offer value or they would not be on the market. If it were possible to engineer and incorporate the superior qualities of all into one machine, certain features would still be considered more important than others in accordance with the individual buyer's requirements.

But there is one essential quality required of all brands — regardless of the job. It is *dependable, low cost performance!* CONOMATIC users know well its benefits. But you don't have to be a user to know about this feature, or any other feature, of the CONOMATIC. Just write, wire, or phone for the information. There is no obligation.

Cross drilling without costly spindle stopping is one of many CONOMATIC innovations which make use of the machine's unexcelled accommodation to tools and work. But any such facility that saves secondary handling is valuable only because of the more important "built in" qualities that keep the machine running.



A Comparison of ALL Automatics is in favor of Cone

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.



Countersink
a $\frac{3}{8}$ " hole in 9 seconds
with the NEW

CLECO

Airmatic

COUNTERSINK

PAT. PENDING

Capacity: $\frac{5}{16}$ " to $\frac{5}{8}$ " hole diameters

The Cleco Airmatic Countersink is a basically new air tool for metal fabricators. It will countersink a $\frac{3}{8}$ " hole in 75-ST aluminum in 9 seconds and will give comparable service in 27-ST aluminum as well as alloy steels.

There are only two controls, one for clamping the tool to the work and one for rotation. A built-in micrometer gives accurate adjustment of the standard bayonet-type countersink. A built-in lubricator assures trouble-free operation.

Mandrels for varying hole diameters and countersinks can be changed rapidly without dismantling the tool.



1 Insert the centering pin in the hole and trip this lever to clamp countersink in place.

2 Pull this trigger and countersink the hole.

3 Trip this lever to release and remove the tool.



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CLECO TOOLS

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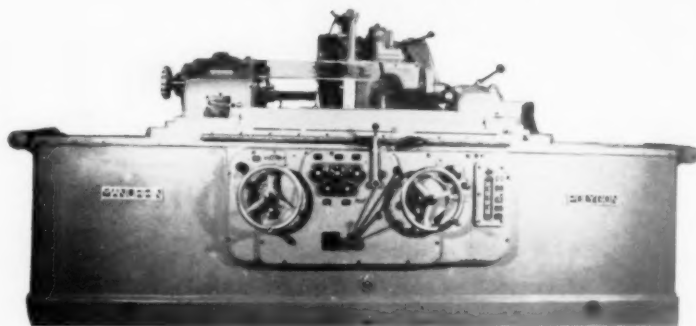
In Canada: Cleco Pneumatic Tool Company of Canada, Ltd., 927 Millwood Road, Toronto (Leaside), Ontario
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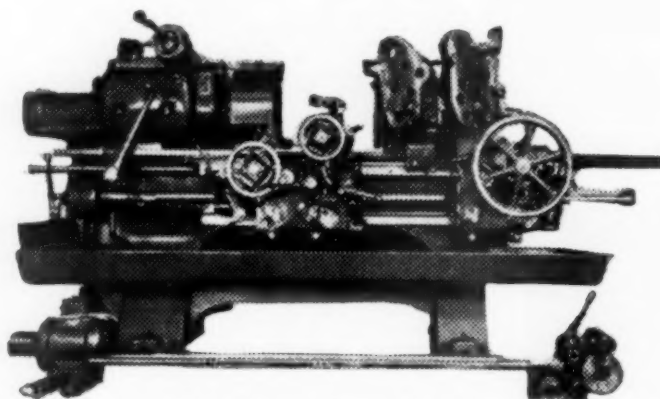


NEW MACHINE TOOLS

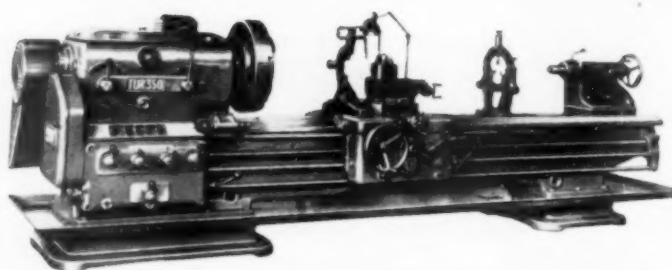
Manufactured by Leading Machine Tool Builders
PROMPT DELIVERY



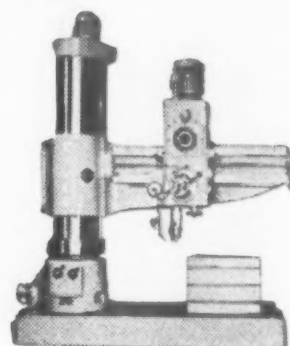
**POLYGON UNIVERSAL GRINDER, CYLINDRICAL, EXTERNAL,
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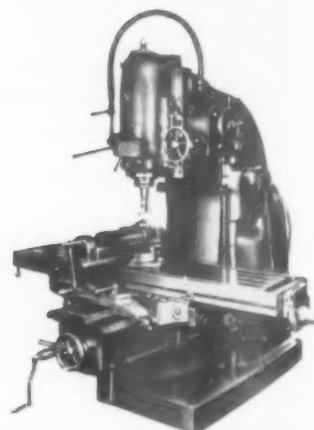
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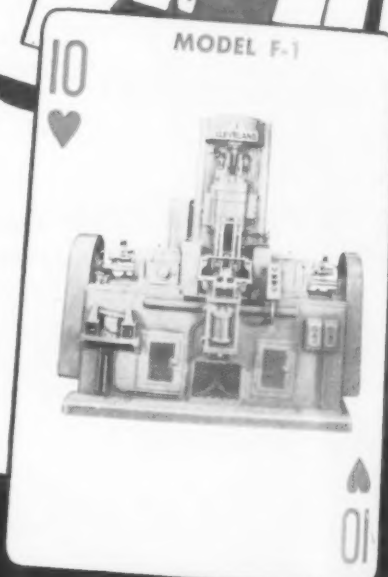
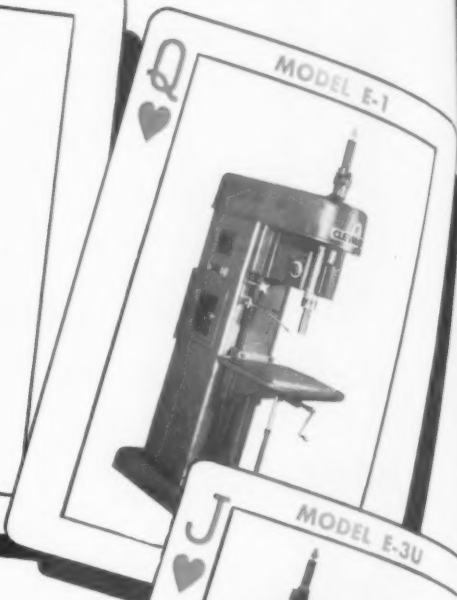
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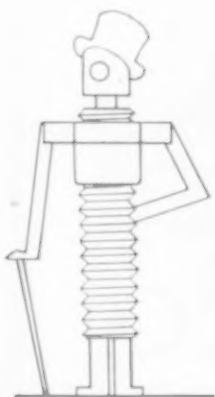
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lead screw



A Winning Combination
See These Cleveland Tappers
at the ASTE Exposition—Chicago

March 17-21 BOOTH 300



Mr. Lead Screw says: We extend to you a cordial invitation to visit us at the A.S.T.E. Exposition in Chicago, March 17-21 International Amphitheatre. You will find us at Booth #300. We will have five Cleveland Tappers on display... with one of the Cleveland Fittings Machines in actual operation. Drop in and get acquainted... see the Cleveland Tappers you have been reading about... the new Type ER... Types E-1, EO, and E-3U. Discuss your tapping and threading problems with a Cleveland engineer. Ask for your copy of the Cleveland Production Tapping Guide. If you cannot get to the show write for this useful guide and a copy of Cleveland Catalog

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Save $\frac{2}{3}$ of Die Cost!

Stringers for aircraft wing sections are formed from flat sheets of aluminum alloy with Hi-Den Dies on a press brake.



Some of America's largest plants are using Hi-Den to save 66% of fabricating cost. **Here's how it's done:** Hi-Den costs less to start with, and it can be shaped with standard tools of tungsten carbide or even high speed steel.

Hi-Den, made from selected wood veneers impregnated with phenolic resin (laminated and compressed at extremely high pressures), is **far stronger than equal weight in steel!** It has been successfully used for nearly 10 years in the aircraft and other metal working industries for dies, jigs, pressure pads, spinning chucks, etc.

Amazing savings are being made with Hi-Den. An aircraft manufacturer* found over 100 different applications for it; a bus manufacturer* used Hi-Den for forming and drawing dies, got a **50% greater depth of draw** than when using a steel die, never had a breakdown or replacement in a 3-year period, and some dies produced **more than 8,000 parts!**

Hi-Den is stronger, has a low coefficient of friction, is superior in drawing sheet metals, is lighter in weight and easier to handle, has dimensional stability and is **extremely versatile.**

INVESTIGATE THIS REMARKABLE NEW MATERIAL!

Send today for technical bulletin "HOW TO USE Hi-Den" to improve quality while reducing costs.

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ASTE Industrial Exposition

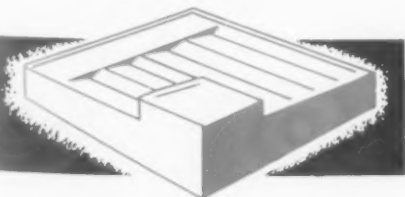
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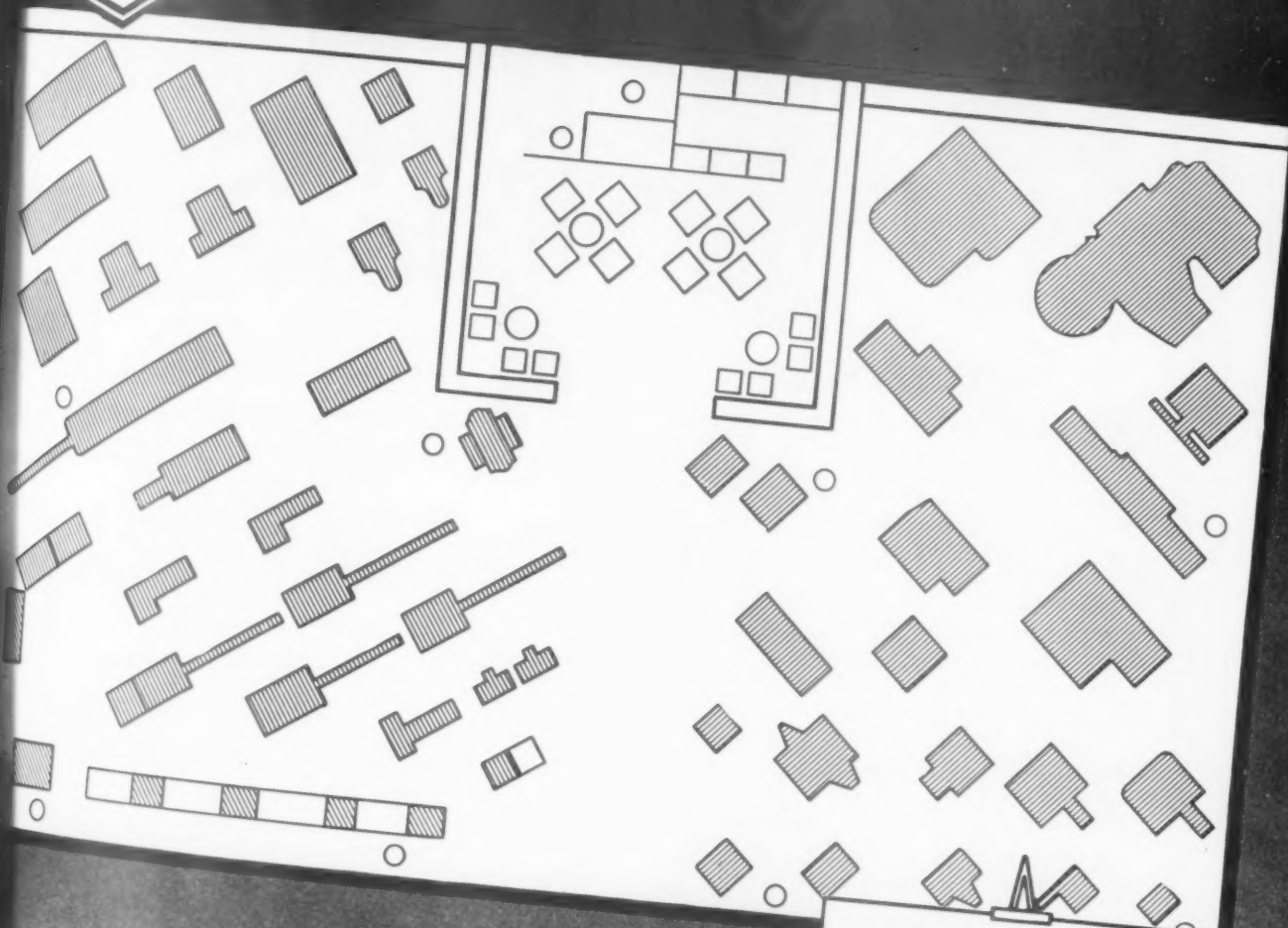
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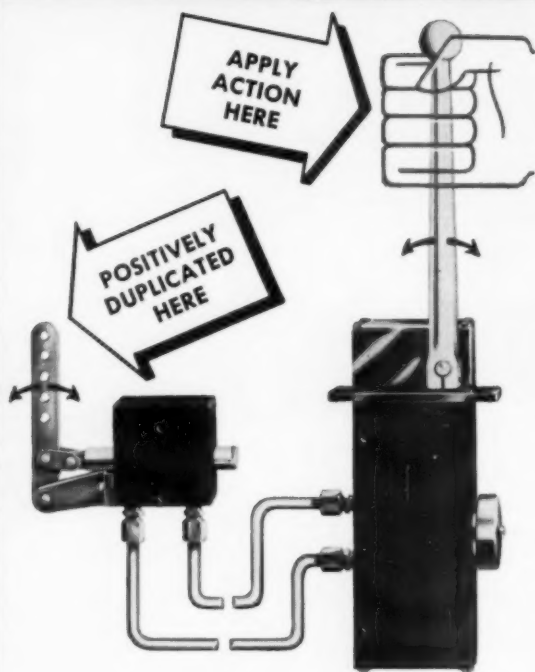
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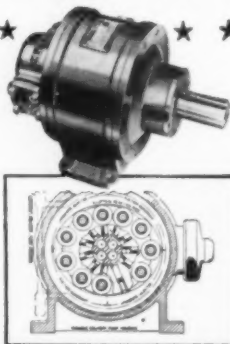
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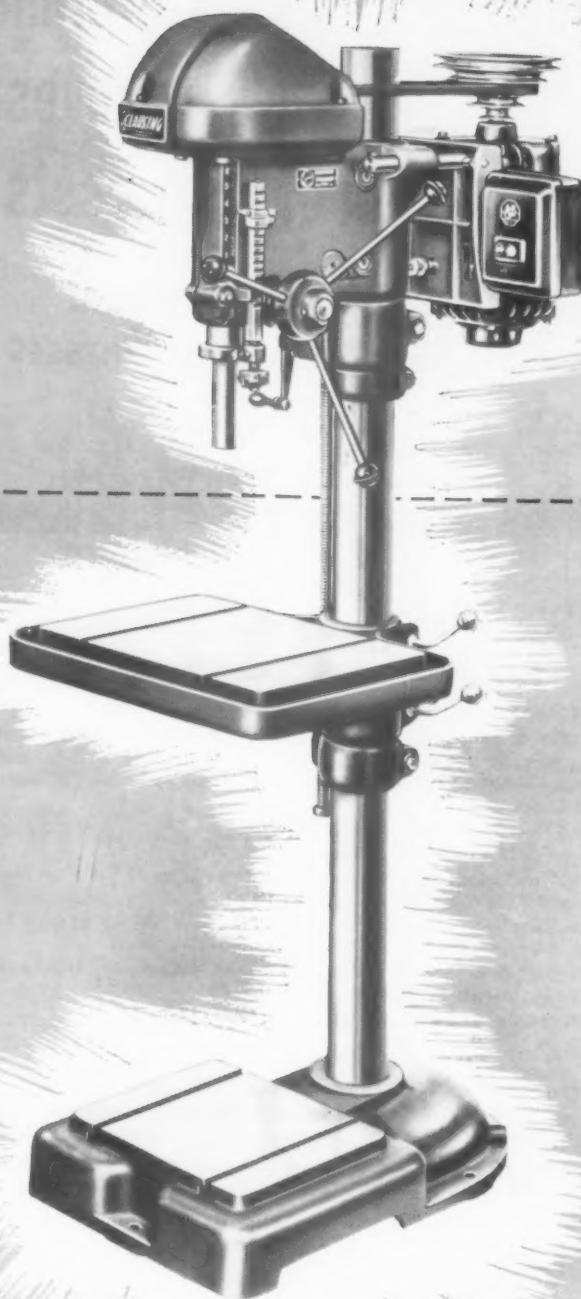
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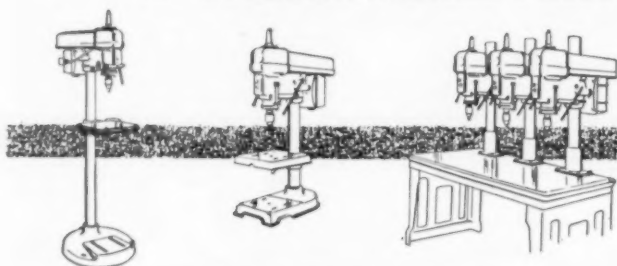
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What to look for at the A.S.T.E. Exposition

For fast, accurate drilling at new low levels of investment and production costs

NEW WALKER-TURNER 15" Production DRILL PRESSES



GENERAL SPECIFICATIONS

SPINDLE TRAVEL: 4 1/4" or 6".
FOUR SPEEDS: 600, 1250, 2440 and 5000 R.P.M. with 1740 R.P.M. motor.
CAPACITY: Bench Models—12" chuck to table, 17 1/2" chuck to base. Floor Models—39 3/4" chuck to table, 46" chuck to base. All models 7 1/2" center of chuck to column.
CHUCK: #6A Jacobs key type capacity 0 to 1/2".
TABLE: 10" x 12 1/4" machined working area.
BASE: 10" x 9" machined working area on Bench Models. 11" x 9" on Floor Models.
SPINDLE: Six spline full floating type, 5/8" diameter, male #33 Jacobs taper for No. 6A Jacobs Chuck, or #1 Morse taper socket (optional).
PULLEY: Straddle mounted on two ball bearings for extra rigidity. New upper mounting permits quick belt changing.
COLUMN: Ground seamless steel tubing, 2 3/4" in diameter.

The specifications give you some idea of the capacity, wide range of speeds, and up-to-the-minute engineering of the new Walker-Turner 15" Production Drills. When you see these machines in operation... note how readily they can be mounted in-line, for simultaneous drilling operations, you'll have a better idea of their accuracy and flexibility.

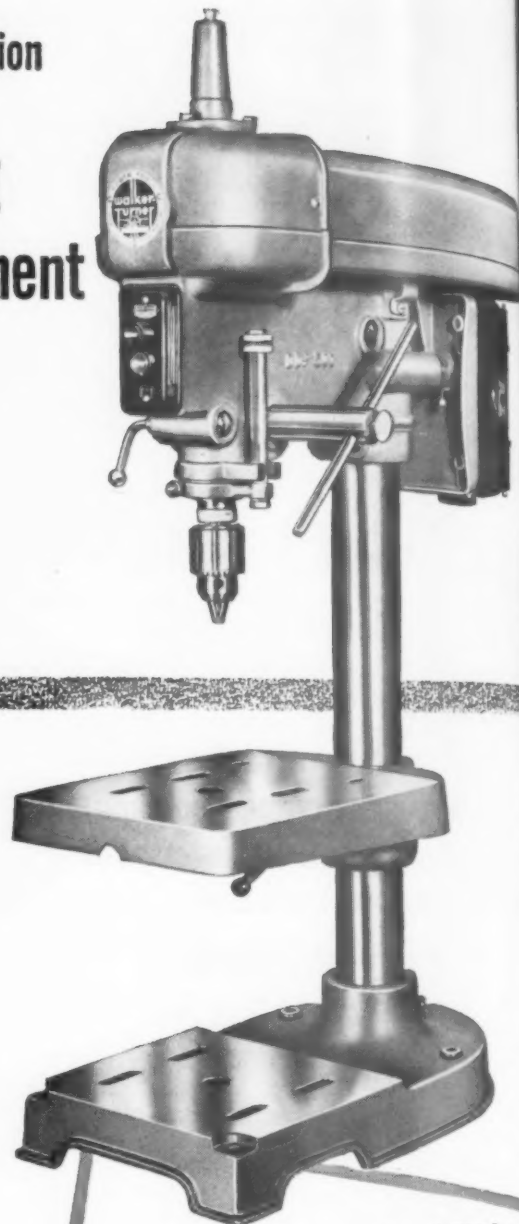
But it's only when these drill presses have been installed in your plant that you can appreciate how Walker-Turner design cuts drilling costs and increases productive efficiency. 72 different models, to meet practically every drilling requirement. Drill heads adaptable to hundreds of diversified uses.

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CHECK THESE FEATURES

- 1 One spot lubrication
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- 4 0" to 1/2" Jacobs Chuck on #33 taper
- 5 Spindle mounted on 2 Ball Bearings
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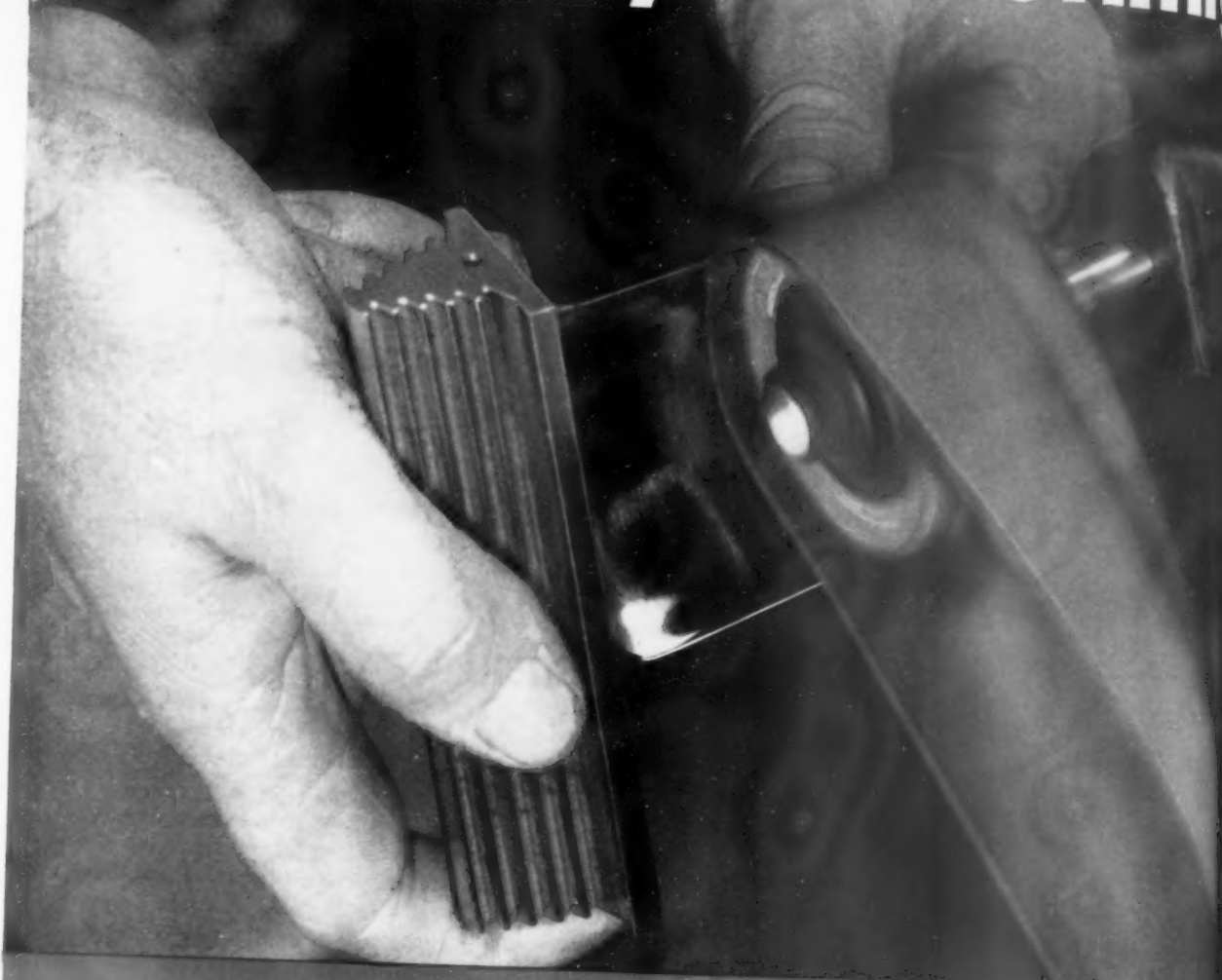
CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

March, 1952

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which definitely prevents weaving of the belt when heavy grinding pressure is applied. Proper operating tension may be maintained through a handy manual control, thus avoiding build-up of loose belt that may appear at the point of grinding contact. The 180-degree "wrap-around"

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division of NORTON Company

new in belt polishing

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New equipment and new applications are constantly appearing. Here's how you can keep up with them.

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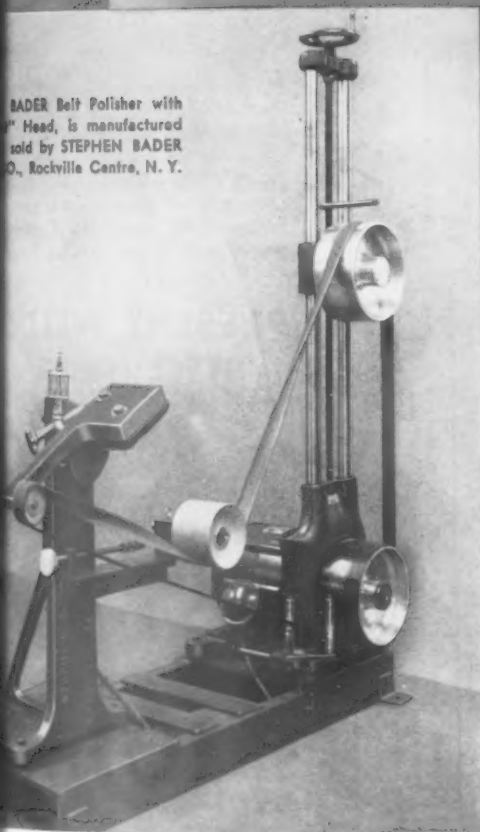
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"Blueprints for Faster, Better Production" gives you a whole series of case studies on new methods and tested coated abrasive products. You'll find it interesting. Address Dept. TE-3.



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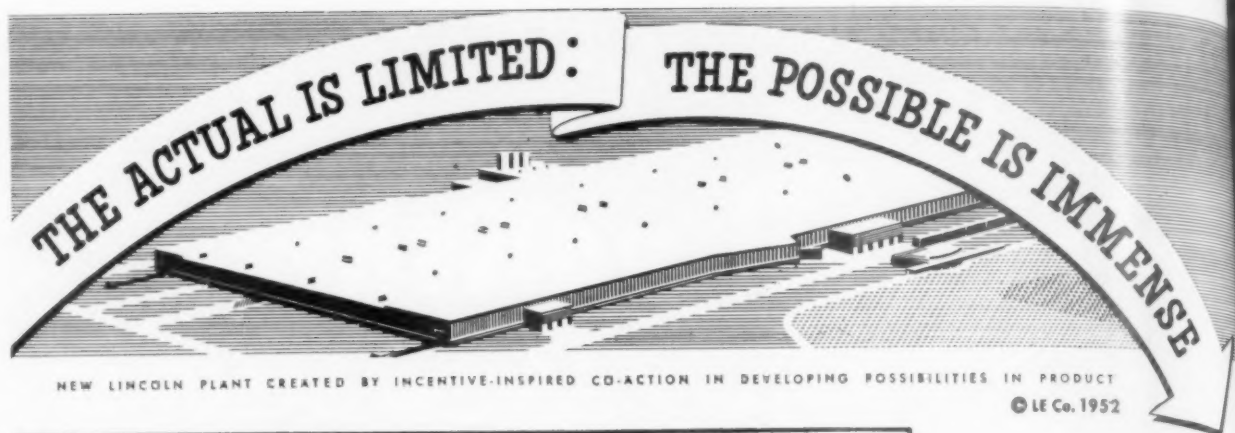
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PROPER DESIGN IN WELDED STEEL IMPROVES PRODUCT ... cuts costs for Hanson-Van Winkle-Munning

THE examples show how one prominent manufacturer has improved the quality of his products while cutting costs by converting to welded steel design.

When designing for efficient welded steel construction, savings in initial material cost alone generally average 85% to 95%. This is because steel costs less per pound. And with steel's greater strength and rigidity, fewer pounds of metal are needed. In many cases, machining operations required for iron can be minimized or eliminated entirely.

Where product designs utilize the economies of welded steel, cost analyses show that:

1. Material costs for steel generally range from 5% to 15% as compared with castings.
2. Labor costs for fabricating steel are about 30% of initial casting purchase costs.
3. Welding costs average 50% of total labor costs for fabricating steel.

If your costs do not approximate these averages, your product designs should be reappraised. A Lincoln Welding Engineer will gladly point out what benefits of welded steel may have been overlooked.

Inquire about the "Weldesign Training Course" for your engineers, designers and production men.

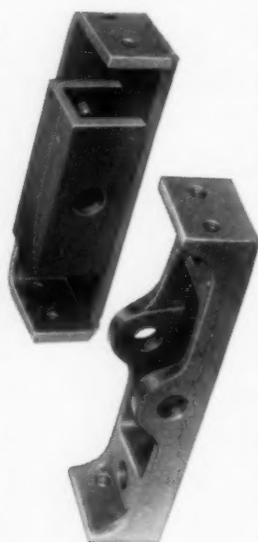


Fig. 3. Welded steel saves 30% cost ... cuts weight 50%. Design is simpler ... plain channel replaces complicated castings.

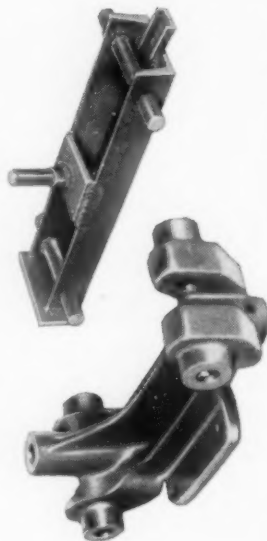


Fig. 4. Stronger, more rugged machine part results when fabricated from steel strip and standard channel. Weight is cut from 3 lbs. to 2 lbs. 4 oz. Cost of this small part is 12% less.

ORIGINAL CONSTRUCTION



Fig. 1. Machine bracket for Hanson Van Winkle-Munning, Matamoras, N.J. weighed 50% more than present steel design. Casting had to be heavy for strength in hub and arm. Design made efficient use of cast metal by providing cored slots. Casting required milling and drilling.

PRESENT WELDED STEEL DESIGN

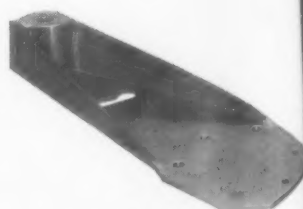


Fig. 2. Finished weldment costs 25% less ... eliminates former breakage experienced in casting. Steel hub cut from bar stock and pre-drilled, is welded to simple formed steel arm in which holes are pre-punched.

MORE SAVINGS

Machine Design Sheets are available to designers and engineers. Write on your letterhead to Dept. 361

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO

The World's Largest Manufacturer of Arc Welding Equipment.

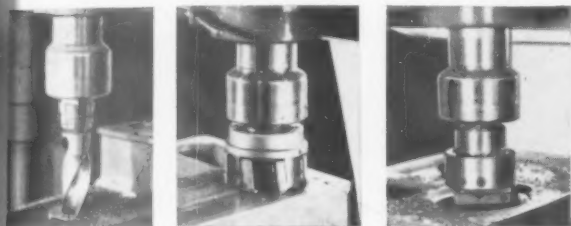
Announcing the new **SIP** jig boring and milling machine

Hydroptic-6

with viewing screens
for table and spindle head settings

OUTSTANDING ADVANTAGES:

- ① Exceptionally rapid co-ordinate settings on the magnified image of the built-in standard scales.
- ② Powerful spindle head incorporating a self-contained drive and a spindle mounted at the nose in double taper roller bearings.
- ③ Large free distances between uprights and between table top and spindle end.



For Further Information
Send for our bulletin No. 1036a

SPECIFICATION

Working range	40 in. × 28 in.
Table working surface	43 1/4 in. × 33 in.
Maximum distance from table top to spindle end	35 1/2 in.
Free space between uprights	43 1/4 in.
Hydraulic feeds	from 12 in. to 100 in./min.
Spindle internal taper	Morse No. 4
18 speeds	from 40 to 2000 r.p.m.
Spindle quill travel	10 in.
Boring capacity	12 in.

Graduation of standard scales built into the work-table and the spindle head saddle	0.1 in.
Size of viewing screens	9/16 in. × 2 7/16 in.
Reading on external auxiliary scales	0.1 in.
Reading on screen micrometer drums	{ dial 0.001 in. vernier 0.0001 in.

Guaranteed setting accuracy: .00015 in.

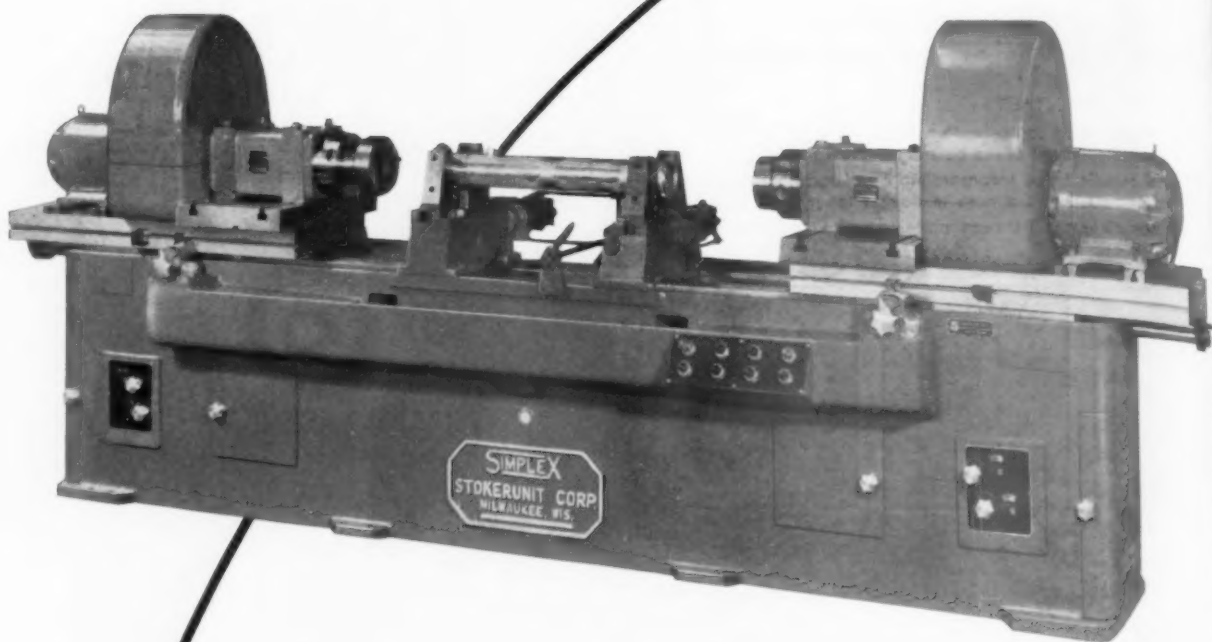
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FOR
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SIMPLEX 2U 2-way Hydraulic Feed Precision Boring Machine with #4 SIMPLEX self contained automatically lubricated precision boring heads to finish precision turn and face the ends of aluminum tubes simultaneously at the rate of 70 pieces per hour at 80% efficiency. The fixture is a pneumatically operated vise type mechanism with controlled clamping pressure to eliminate part distortion.

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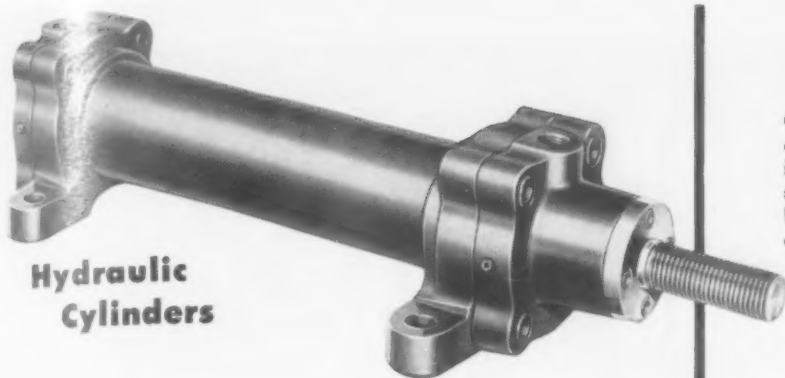
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Precision Boring Machines, Planer Type Milling Machines, Special Machine Tools



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Complete hydraulic cylinder catalog, illustrating design features, styles, dimensions. Also bore tables, engineering data and formulae.

Write for Hannifin Bulletin 110.



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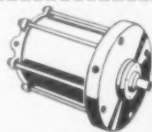
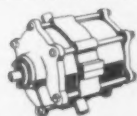
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Hannifin Engineering Service. Hannifin maintains a large staff of factory-trained field engineers. They are available for consultation on any hydraulic or pneumatic actuation problem.

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CYLINDER**
to fit
your machines

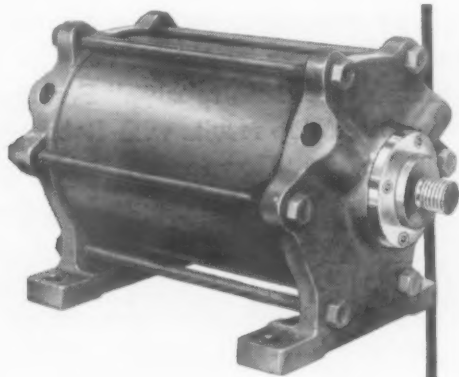


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Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Hydraulic Riveters • Air Control Valves

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Cylinders**

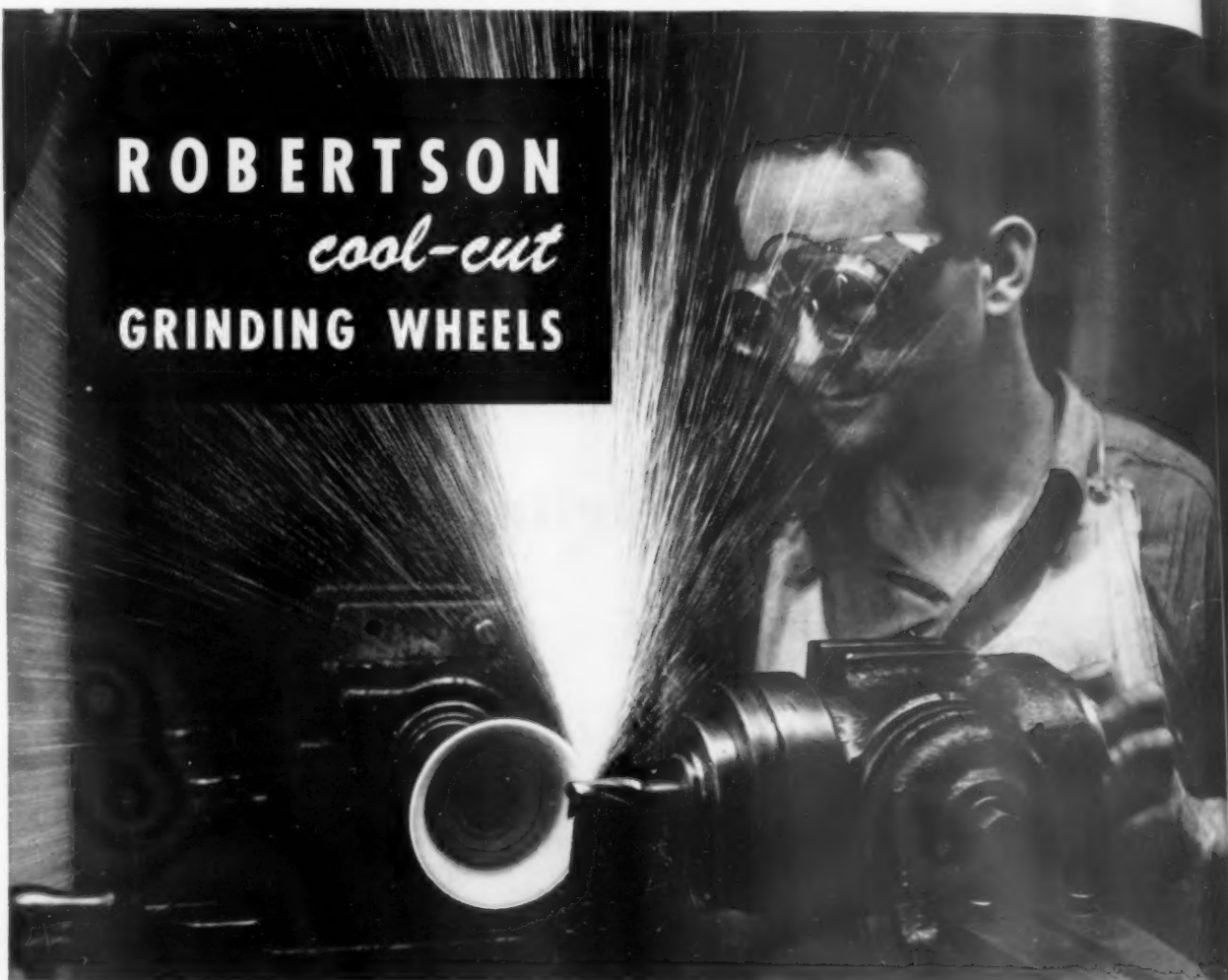


Complete illustrated pneumatic cylinder catalog giving design and construction features, bore tables, mounting styles and other information.

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ROBERTSON *cool-cut* GRINDING WHEELS



Unretouched photo of Robertson Flaring Cup Cool-Cut in action in precision-tool manufacturing plant. (Name of plant in road.)

PRECISION MADE . . . FOR PRECISION PERFORMANCE

PICK UP A Robertson Cool-Cut Grinding Wheel and examine it closely. Note the uniform structure, the fine finish . . . sure signs of high-quality workmanship. Then put the wheel to work.

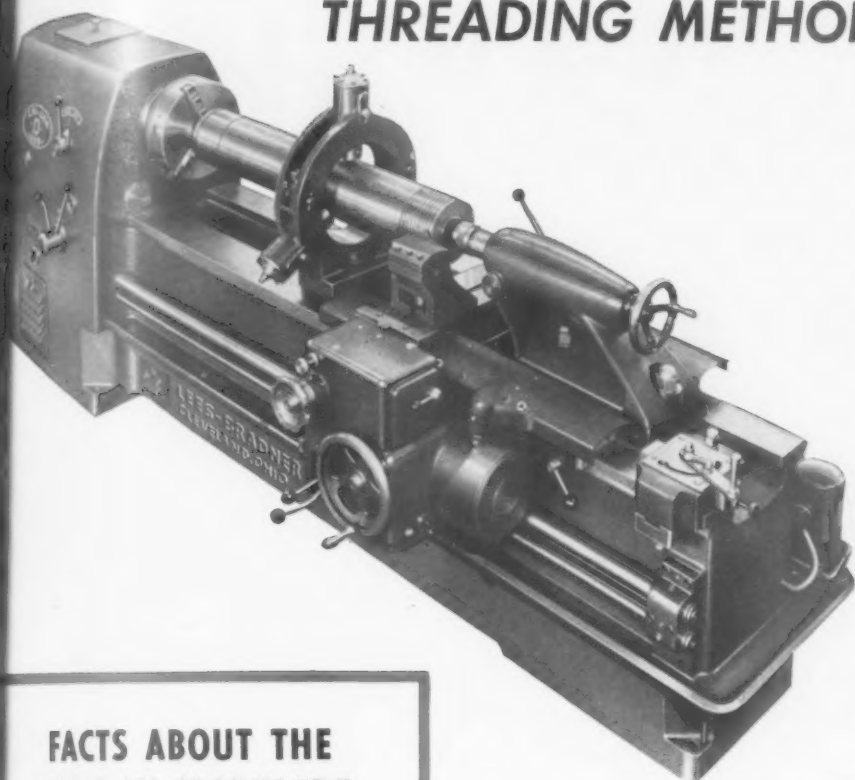
What your eyes have told you, the finished work will confirm. With Robertson Cool-Cut Wheels you'll produce work more accurately held to size, with the desired finish, and with less effort. Quality such as you find in Robertson wheels is the result of painstaking care in manufacture and 50 years' experience.

The direct result of Robertson's precision methods is precision performance. Many users report: "Cuts grinding time in half" . . . "Production tripled" . . . "Reduces tool-grinding costs 10% to 20%." For all grinding operations—even the tough ones—you'll get top results with Robertson Cool-Cut Wheels. Send for free copy of the booklet "How to Buy Production Time."



ROBERTSON MANUFACTURING COMPANY
TRENTON 5, NEW JERSEY
Vitrified, Resin, Segmental Grinding Wheels

still using "OLD FASHIONED"
THREADING METHODS?



FACTS ABOUT THE CRI-DAN MODEL "D"

SPECIFICATIONS

Motor requirements	15 HP
Spindle speed (24 speeds), 100-1200 RPM	
Swing over saddle	12"
Swing over bed	21"
Capacity between centers	60"
Maximum length of thread	5 1/4"
Max. exter. diam. of thread	12"
Max. inter. diam. of thread	16"
Maximum depth of thread	250
Multi-start threads	Up to 12 starts
Taper threads	30° incl. angle
Length of machine	12'0"
Width of machine	3'7"
Height of machine	4'6"
Approx. weight of standard machine	6900 lbs.

Learn about the New CRI-DAN "D" —the largest of the CRI-DANS

50 CUTS A MINUTE . . . that's the speed at which the new Cri-Dan Model "D" Threading Machine can operate.

This unusual high rate of speed is accomplished with a SINGLE POINT CARBIDE THREADING TOOL which is controlled by a high precision cam instead of the conventional leadscrew. This cam guarantees accuracy of pitch as well as a precision thread. The Cri-Dan Model "D" is the newly introduced "big brother" to the Cri-Dan "B" which has been setting new records in threading economy and accuracy.

It will pay you to get the whole story on this time-saving, money-saving machine. Why not get in touch with your Lees-Bradner representative?

VISIT BOOTH 2030 AT THE A. S. T. E. SHOW AND
SEE BOTH THE CRI-DAN MACHINES IN OPERATION

the **LEES-BRADNER**

CLEVELAND 11, OHIO, U.S.A.

Company

we Hug That Work

to cut your portable grinding costs!

FASTER GRINDING, LONGER WHEEL LIFE AND LESS OPERATOR FATIGUE add up to big savings when Norton wheels take over your portable grinding jobs. *They hug that work!*

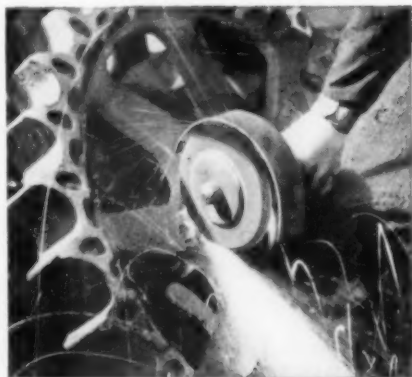
Yes, Norton portable grinding wheels have *controlled uniformity* and *built-in balance*, the like of which you've never seen before. This gives them a unique ability to stay in more continuous contact with the work. This *plus* comes from the "new process" of manufacture recently developed by Norton technicians . . .

an outstanding step in the continuing Norton program to cut all your grinding costs.

Ask your nearby Norton distributor to give you all the facts about new, improved Norton portable grinding wheels. He's listed under "Grinding Wheels" in your classified telephone directory. Or write direct to Norton Company, Worcester 6, Mass. Distributors in all principal cities.

EXPORT: Norton Behr-Manning Overseas Inc., Worcester, Mass., New Rochelle, N. Y.

NORTON PORTABLE GRINDING WHEELS HUG THAT



SNAGGING GIANT DRIVE WHEELS is just one of many jobs done by Norton straight wheels at lower labor and wheel costs. *They hug that work.* So, they don't waste time or wheels . . . nor tire the operator.



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SURFACING A MACHINE TOOL BASE is easy work for a Norton cup wheel and its operator. The wheel's fast, smooth cutting action means low grinding cost and minimum operator fatigue.



Making better products to make other products better



WORK AND CUT YOUR COSTS ON JOBS LIKE THESE:



SMOOTHING UP THIS BED CASTING OF A PRINTING PRESS is a typical example of the cost-cutting performance of Norton cone wheels. They're built to take it . . . thanks to the special Norton resinoid bond.



CLEANING BETWEEN THE FINS OF THIS COMPRESSOR CASTING is an easy job with a Norton REINFORCED Hub Wheel of the rigid type — the BD. It's fast cutting, and its layers of fabric reinforcement assure maximum safety.



BLENDING IN A WELD can be done speedily with the new flexible Norton REINFORCED Hub Wheel. It's known as the Type BFR and is not only fast cutting but safe to use because of its fabric reinforcement.

SEE the new flexible **NORTON REINFORCED RESINOID** hub wheel at the **A. S. T. E. Show - Chicago - Space 1039**

NORTON
ABRASIVES

March, 1952

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263

IT TAKES *more*

You

HAN A GOOD MACHINE TO CUT A GOOD GEAR

As every gear man knows, the control inherent in the Fellows Method can turn out gearing of super accuracy.

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Of the same high order is Fellows Field Engineering Service. So, for high-accuracy gears, start by discussing your over-all plans with an engineer from the Fellows Office nearest you.



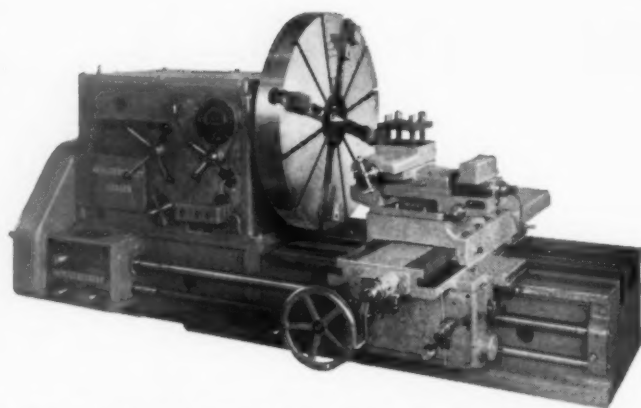
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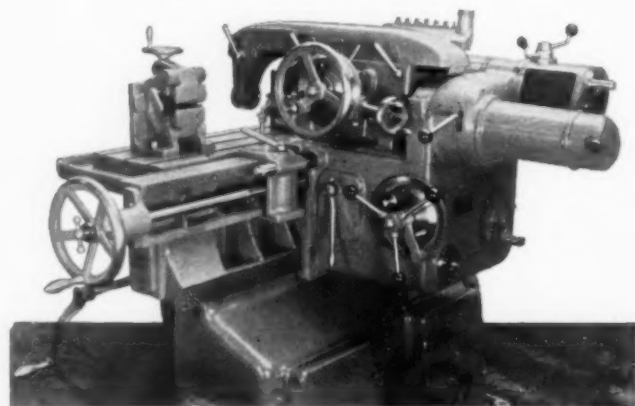
it takes:

- The determination to produce a quality product
- The establishment of adequate metallurgical "specs"
- Blanks to have precision-machined bores and faces
- Blanks to be held true with bore
- Real care given to set-up in mounting blank
- Fixtures to have precision locating-faces
- Studied balance between roughing and finishing cuts

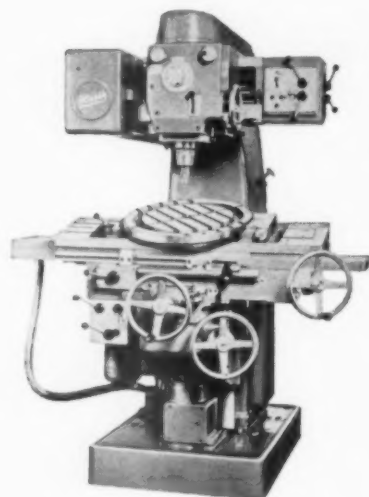
You've been hearing about these German Machine Tools



For machining jet engine parts and T-turning bulky work—HEYLIGENSTAEDT Facing Lathe. Turning diameter 51" over bed, 67" in gap. Infinitely variable spindle speeds over 1:6 ratio; 3 back gears; power feed in carriage; lower and upper cross slides. Models available without leadscrew or with movable bed.



Swiveling spindle mills accurate keyways and slots—Design of FORST Slot and Keyways Milling Machine permits use of cutters of smaller diameter than width of desired slot or keyway, compensating for errors in cutter size or machine operation.



Vertical, downfeed milling and jig boring in one machine—In one set-up of the HURTH V10a, longitudinal traverse of tiltable worktable handles vertical milling; longitudinal traverse and graduated downfeed of cutter spindle does downfeed milling; spindle downfeed performs jig boring. For precision work on jigs, fixtures and other tools; also adaptable to production runs.

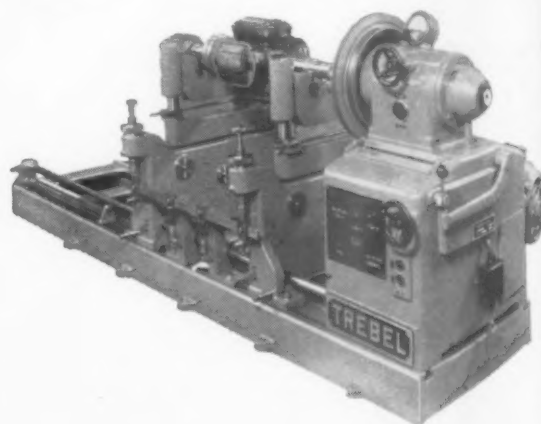
Close tolerance grinding of very thin work—Spindle of REINECKER Rotary Face Grinder can be adjusted within .000039" while operating and tolerances from face-to-face of workpiece held within .00004" to .00008" on disc type control valves, space rings, gear shaper cutters and similar parts. Automatic work cycles.

These pages can tell only part of the story of the diversity of machines and machining performance you can expect from so wide a range of equipment...all German precision-built...many already on the production lines of leading U. S. metalworking plants.

Now you can see them in operation at the Tool Engineers' Show...evaluate them in terms of your own production needs, and talk with principals of the plants who built them. Orban engineers will also be on hand to show you their cost-cutting features.

Delivery is prompt, too, and replacement parts will be available from our Service Center in Cleveland.

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Checks unbalance of rotating parts in 60 seconds—TREBEL Dynamic Balancing Machine needs no special operator skill. Unique principle, uses a counter-force to compensate for unbalance; no complicated set-ups; gives direct, accurate readings in simple units.



NOW SEE THEM IN ACTION

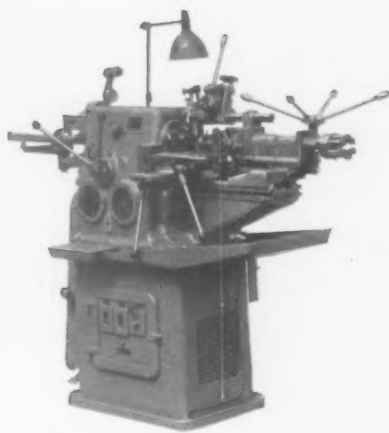
BOOTH #1000 ASTE SHOW



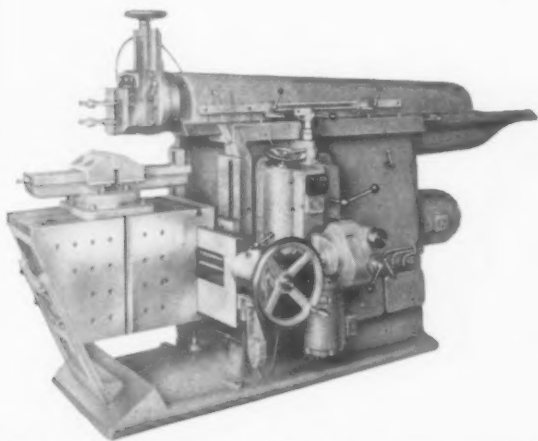
Uniform, concentric twist drill grinding—Planetary drive gear system on CAWI-SPIRAL machine consecutively grinds two- and three-lip twist drills from .078" to 1" diameter...assures accurate drill angles.



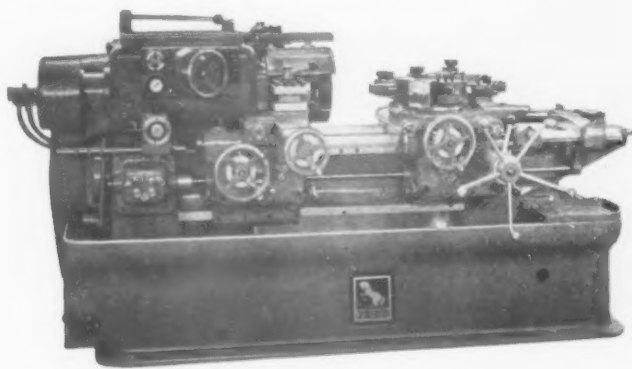
Simplified lathe for fine finishing and high-production—MAGDEBURG Precision Lathe with V-belt drive provides accuracy of precision boring machines...does work of fine finishing lathes in around-the-clock production. Includes contour attachment.



Hand screw machine and turret lathe for precise small runs—The HESTIKA provides single lever control for collet; normal spindle speed, threading spindle speed and reverse and spindle brake. Simple to set up, extremely fast operation.



Low-cost, high-production shaping—In KLOPP High-speed Shapers, cutting head travels to the work. 3 hydraulic types with 26" to 39 1/2" strokes; 4 mechanical models, stroke lengths from 11 3/4" to 26 5/8"; 7 traversing models with up to 40" stroke for workpieces 6' to 18'.



Ultra-precision machining at high-production rates—SCHEU Turret Lathe is modern in every design and operating detail for modern production-line needs...same models as shown and sold at recent Paris Exposition. 16 spindle speeds from 15-1500 rpm. Hydraulic pre-selector.

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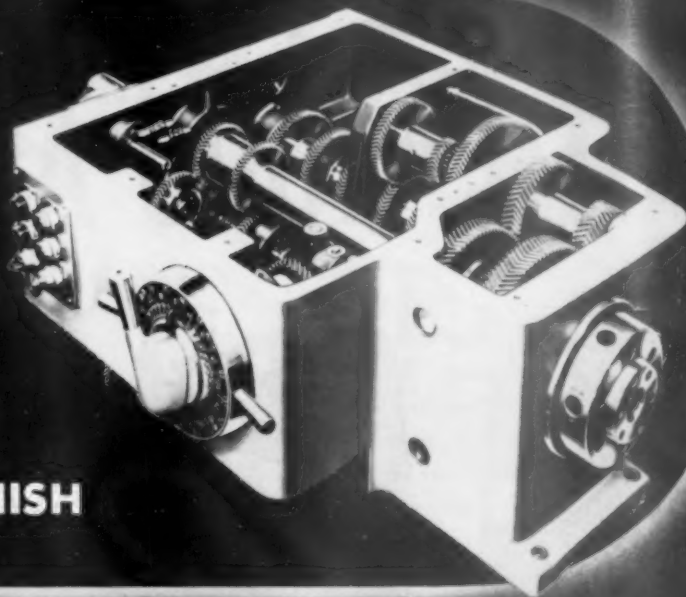
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267

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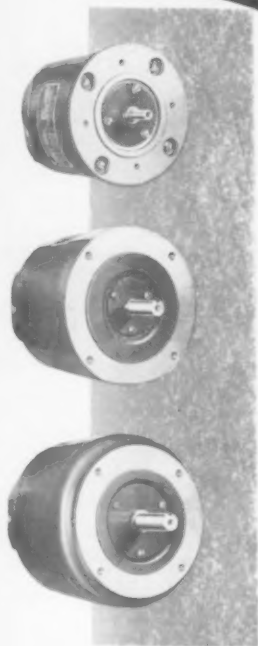
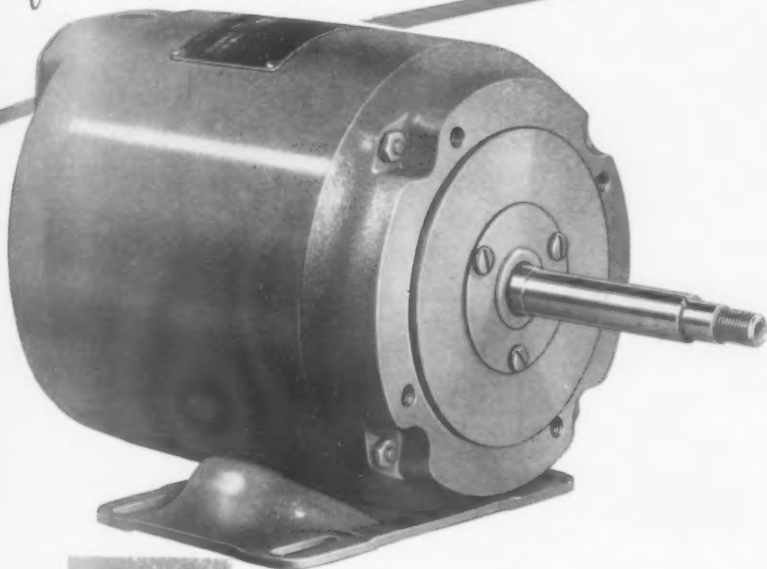
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...LOCKHEED IN CALIFORNIA RAISES ENGINEERS' SALARIES

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1. A "bonus" every day in better living—just because you live in Southern California, in an area where the climate is beyond compare.
2. A future that offers both security and advancement, helping create planes for defense, planes for the world's airlines in Lockheed's long-range development program.
3. Better *personal* working conditions among men who have built a reputation for leadership in aviation.

To forward-looking Tool Engineers:

Become an Aircraft Engineer at Lockheed's Expense

The Step up to Aircraft Engineering isn't as steep as you might expect. Aircraft Experience isn't necessary. Lockheed takes your knowledge of engineering principles, your experience in other engineering fields, your aptitude, and adapts them to aircraft work. You learn to work with closer tolerances, you become more weight conscious.

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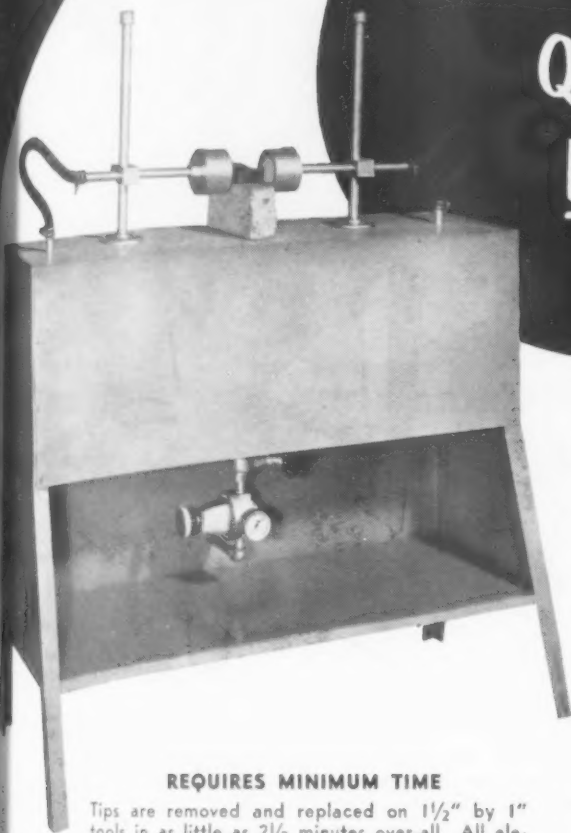
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Refractory-cup radiant gas burners, supported by adjustable clamps, can be faced to within ¼ to ½ inch of tool shank.

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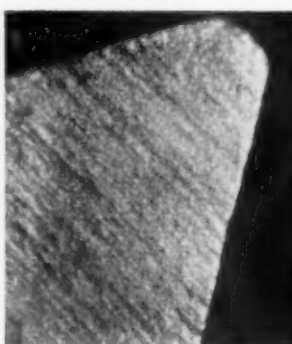


- Type B 20
- Model S.D.
- New small Model for tool room use.

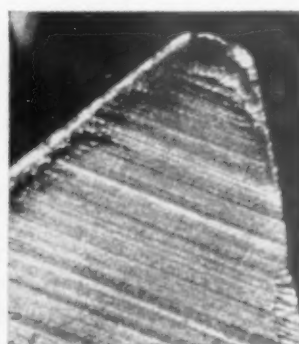
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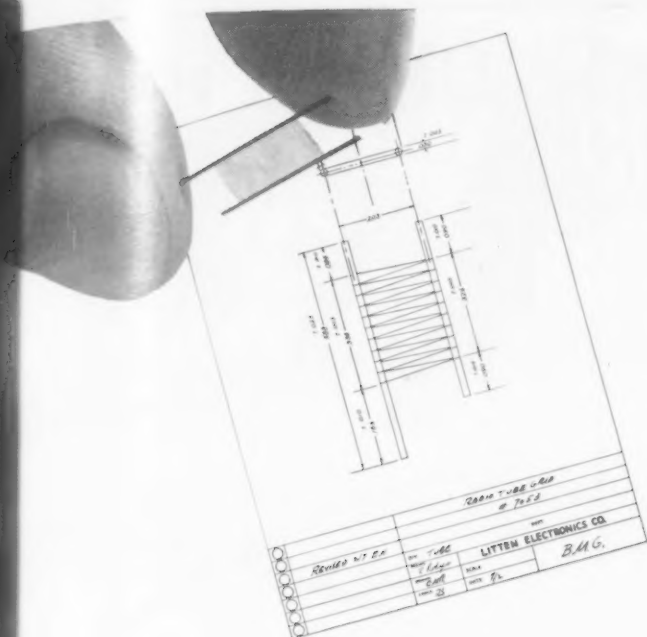
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The new Model 2A is seen here being used to measure spot samples of parts far too delicate for any but the optical method of gaging.

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In your area there's an engineer with wide experience in both aspects of optical gaging technique. It will cost you nothing to discuss with him the details pertinent to your own particular requirements. To get in touch with him, write Eastman Kodak Company, Industrial Optical Sales Division, Rochester 4, N. Y.



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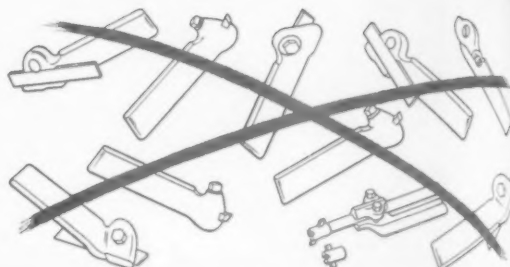
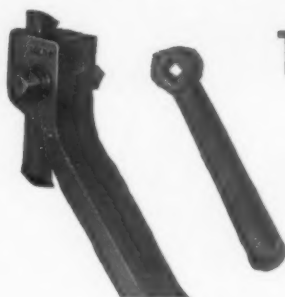
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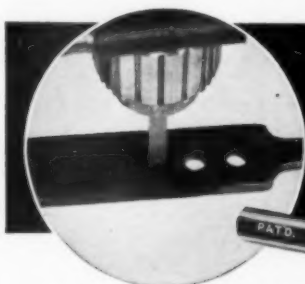
TEN



ONE tool holder for all positions—No tool chatter—can do internal boring or internal threading—Ideal for carbide tools—Bit sizes: 1/4", 5/16", 3/8", 7/16"

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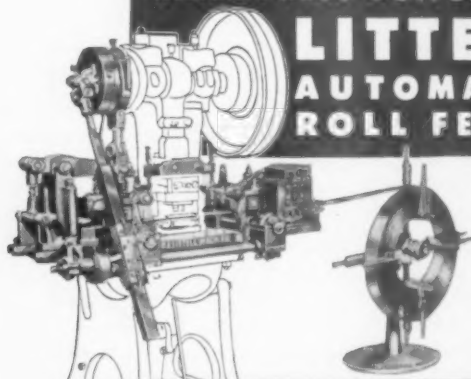
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The Tool Engineer

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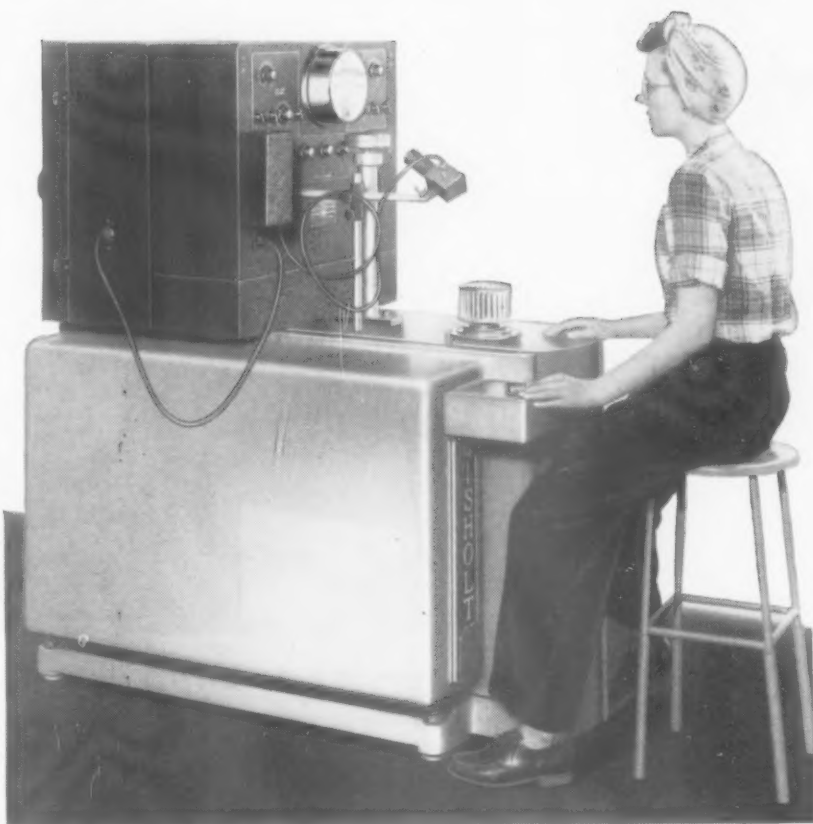
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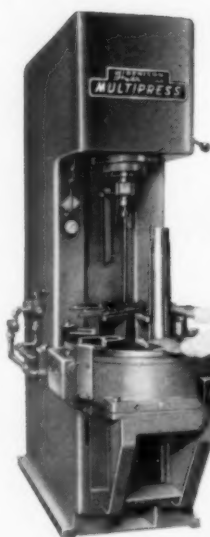


GISHOLT MACHINE COMPANY
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AS
MUCH
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300%**



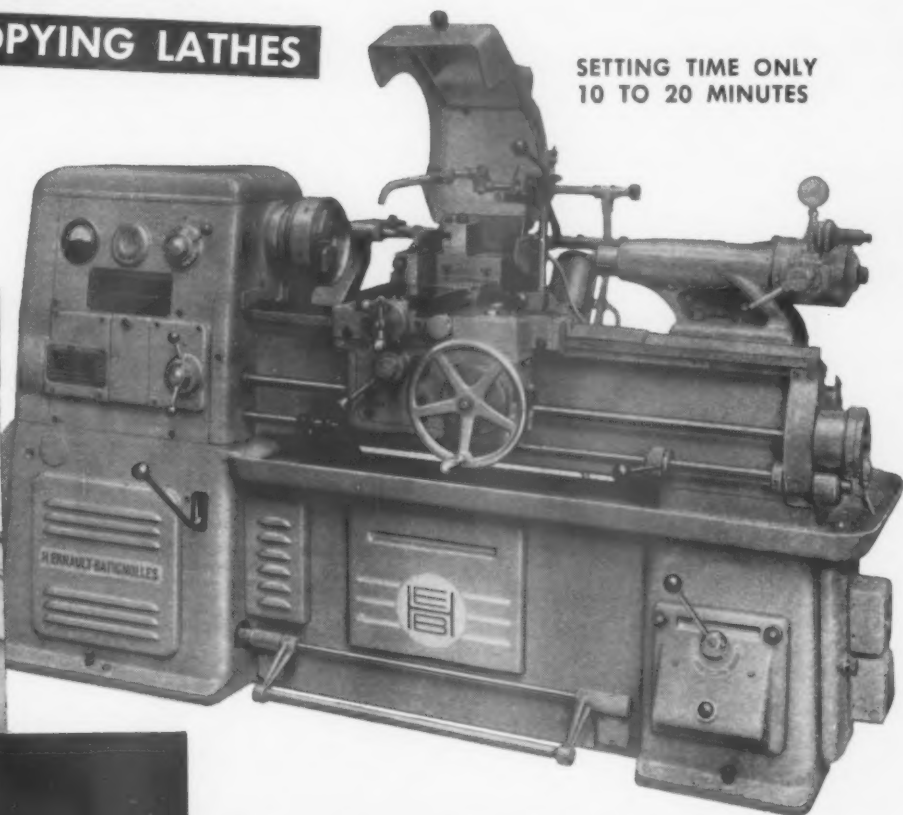
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**For Reduced Costs and Increased Accuracy
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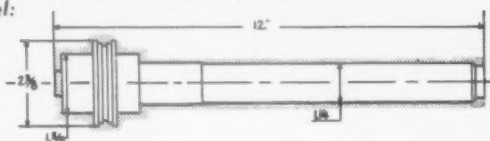


GT MODEL Mold and sample of glass dish.
Machining time: 3 1/2 hours.

**Typical part machined on the H.E.B. Copying
Lathe — OP Model:**

PISTON

SAE 1035 Steel
copy-turned with
carbide tool at 650
SFPM and .0135"
Feed.



Floor-to-Floor time: 1.85 minutes.

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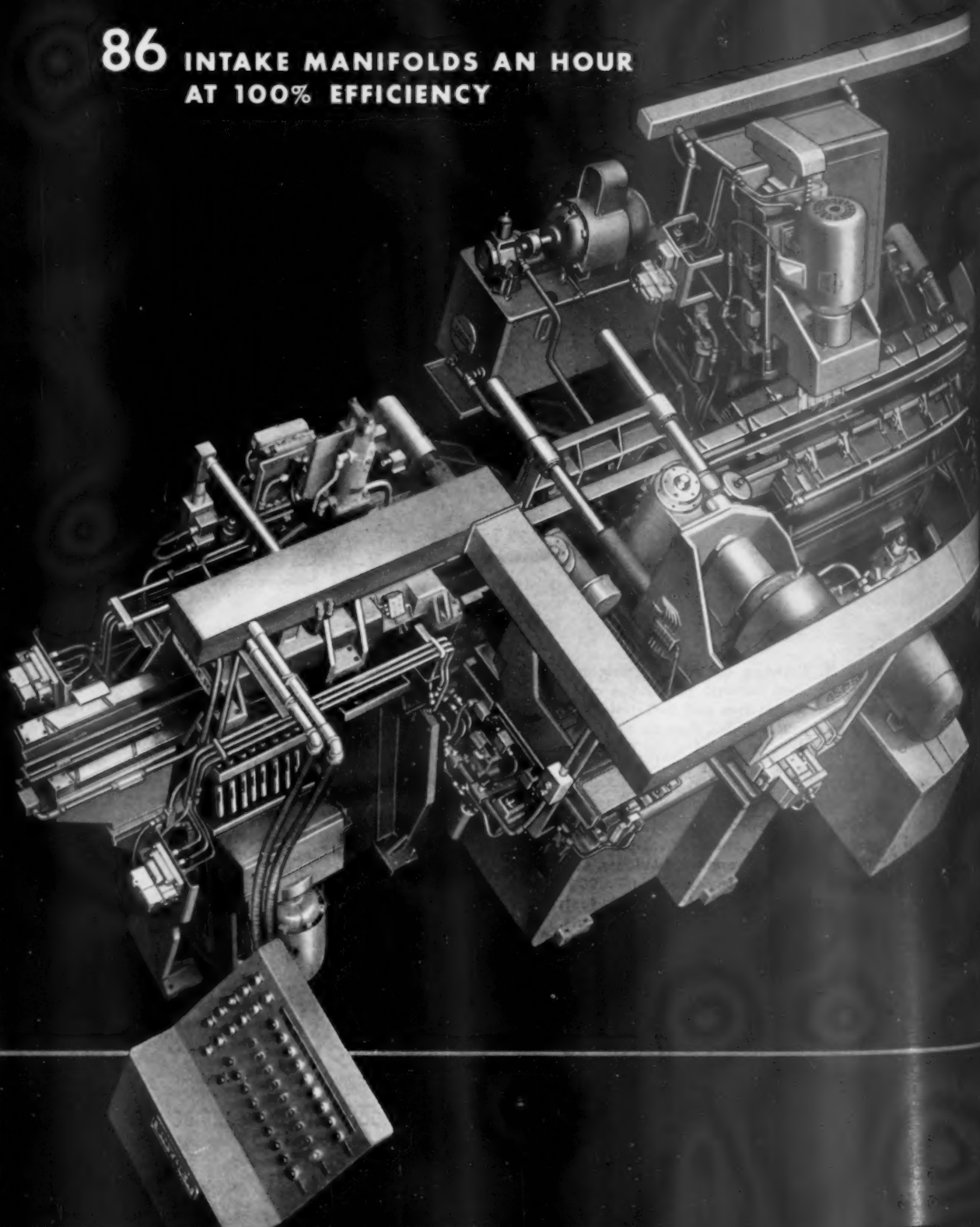
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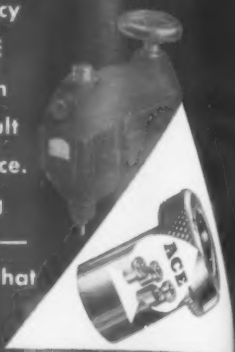
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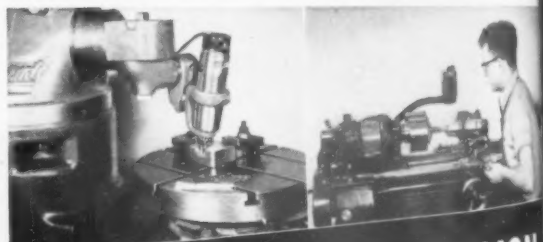


ASK FOR
CATALOG
1101-2

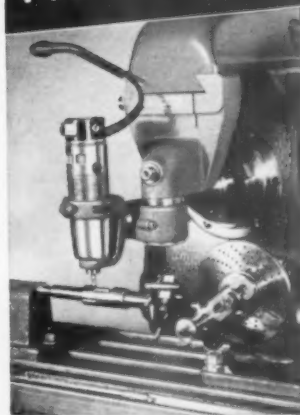
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5401 Fountain Avenue
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Distributors in all principal industrial areas. Write us for
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LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH

Little can be done today to reduce labor and material costs. For substantial savings employ new, better technique. Mount PRECISE Grinder-Miller on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. 1/2 HP. speeds from 20,000 to 4,000 r.p.m. 15 inch AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearing. High speeds are ideal for tungsten carbide cutters. PRECISE will grind, mill, finish any material from soft steel to the hardest alloy steel.

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PRECISE GRINDER-MILLERS

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The Tool Engineer

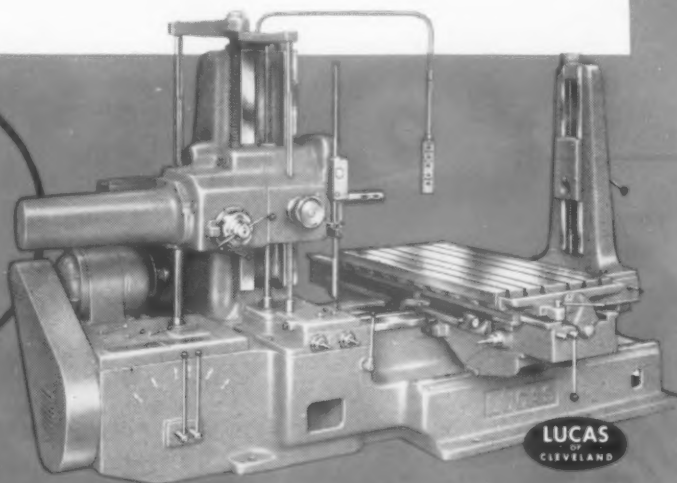
You can do 'most any job on a **LUCAS**

And . . . because you can do such a wide variety of operations on a Horizontal Boring Machine, it is today one of the most **CRITICALLY NEEDED** machine tools in the entire re-armament program.

The overwhelming demand for the LUCAS Horizontal Boring Machine, which embodies every important design improvement, many exclusive with Lucas, has built up a backlog of priority orders which make short time deliveries difficult.

Therefore . . . in appreciation of your preference for Lucas Machines, we gladly offer our services and suggestions on how better methods and improved operating practices can help you to step-up production on your present Boring Machine equipment until your new LUCAS can be delivered.

Automatic Power Positioning ★
Integrally cast 4-way beds with
4-point support ★ Complete range of
feeds and speeds to one spindle ★ Pendant
Control ★ Vibrationless V-belt drive to
spindle at high speeds ★ Complete
line of attachments ★ Chrome
plated lead screws



LUCAS

Precision

HORIZONTAL BORING DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO., CLEVELAND 8, OHIO



Simplify and Speed Precision Work

with these

TAFT-PEIRCE Production and Inspection Tools

For Gaging

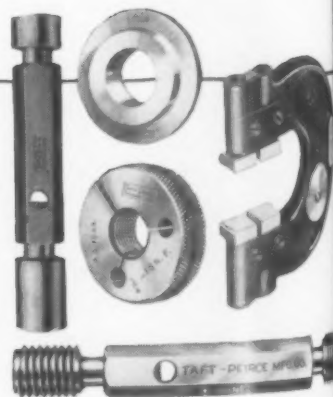
T-P COMPAIRATOR. Positively the most versatile air gage available! It can be used for any type of production measurement from simple diameters to complex multi-dimensional checks.



T-P PRECISION GAGE BLOCKS provide honest, enduring accuracy. Fingertip pickup and large size markings on their sides add convenience. No finer gage blocks are made here or abroad.

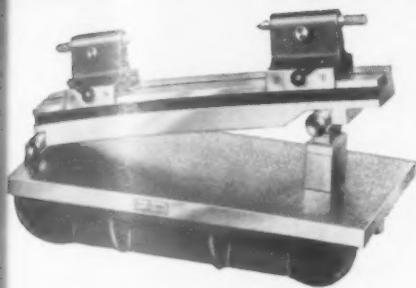


T-P POWER THREAD GAGING UNIT is the fastest thread gaging method ever devised. Push — and the gage screws into the work. Release the pressure and it stops. Pull — and it disengages.

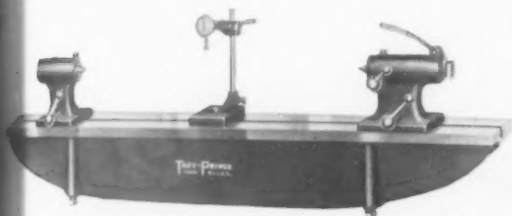


T-P FIXED GAGES. A complete line of standard and special fixed gages for every gaging need.

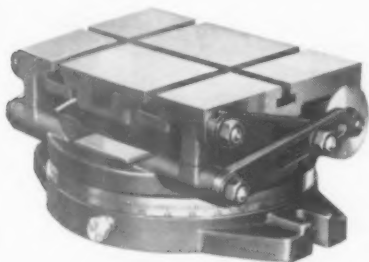
For Setting-Up & Inspecting



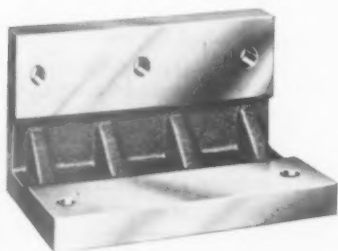
T-P TAPER TESTING FIXTURE combines a Sine Block with a pair of adjustable mounted precision centers. Checks tapers to high degree of accuracy. The T-P surface plate is one of a large line of standard sizes.



T-P BENCH CENTERS simplify inspection work. Have unusual rigidity and permanent accuracy. This is typical of a wide range of inspection tools available at Taft-Peirce.

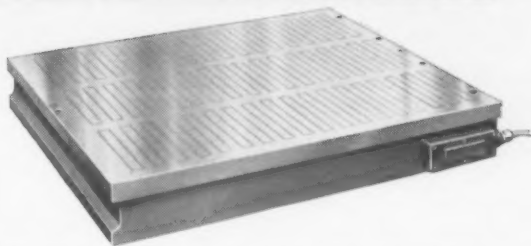


T-P ADJUSTABLE ANGLE PLATE has a tilting table mounted on a rotating base, graduated from 0 to 90 degrees in each direction. Simplifies setups for machining compound angles.

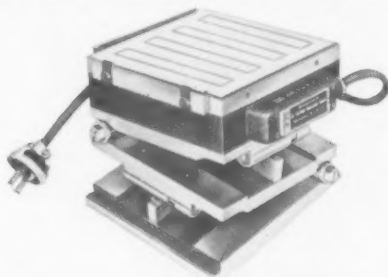


T-P DUPLEX ANGLE IRONS. Finished inner pads increase accuracy, permit faster setups. Just one example of the many production tools in the Taft-Peirce line.

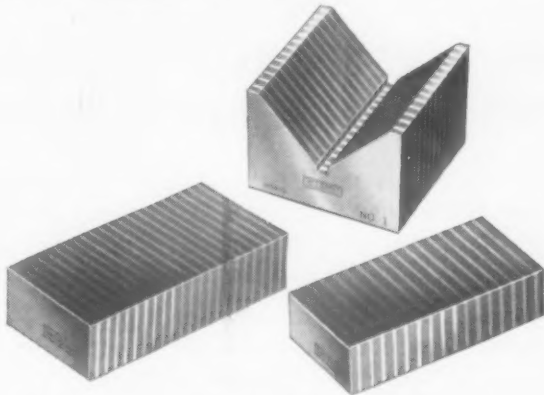
For Magnetic Work-Holding



T-P SUPERPOWER MAGNETIC CHUCKS are magnetically more powerful size for size. They provide more versatility, faster setups, greater working surface, and low magnetic losses. Available in wide range of standard sizes or on special order.



T-P SUPERPOWER MAGNETIC SINE-ANGLE CHUCK speeds positioning of tricky angle grinding jobs. Gage blocks placed between roll and base plate assure high precision.



T-P UNIVERSAL MAGNETIC PARALLELS AND V-BLOCKS. Available in stock sizes. Special sizes made to order.

For the complete story on these items and many more, get your copy of the Taft-Peirce Handbook.



*T-P means
Top Precision*

THE TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND • Branch offices in all principal cities

...of Special Interest to **HOLE** Engineers



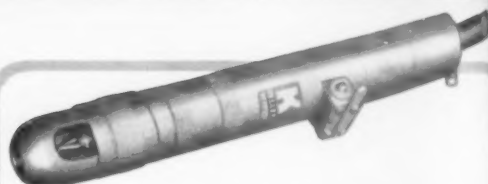
HOW AIRFEEDRILL* BROKE A PRODUCTION BOTTLENECK

In producing this small part, a drilling operation kept one worker busy full time. Her output set the pace for the entire production line... placed a top limit on output per hour and per day.

The job didn't warrant an extra drill press and operator, so the ingenious shop foreman set up a simple mounting and fixture with a Keller Airfeedrill.*

Now by pressing a valve, holes are drilled as fast as the operator can load and unload the fixture. Castings pass this operation so fast that the worker has time to do other jobs, too. Production of the whole line has increased, and costs have gone down accordingly.

The Airfeedrill can help you speed output of short run or production drilling jobs. A Keller sales engineer will gladly discuss it with you.



- Assures accurate holes without costly fixtures... can be used with existing jigs
- Attaches in any position and supports itself at any angle
- Operates and is controlled entirely by air... with pneumatic cycling to speed production, reduce operator fatigue
- Small size permits it to be used on close centers and in tight places
- Accurately drills parts too large for conventional drilling machinery
- Wide range of speeds and strokes will accommodate light or heavy metal, wood, composition, plastic
- Lightweight portable and stationary models are readily adapted to changing job requirements... quickly shifted from job to job

* Keller Tool Company Trade Mark



KELLER TOOL COMPANY
GRAND HAVEN, MICH.

KELLER *Pneumatic Tools*

First & Finest!

Jones & Lamson Radial Chaser Die Heads

GROUND
with **THREAD
CHASERS**

These Die Heads will do an outstanding job on large or small lots, in pitches ranging from extremely fine to coarse multiple Acme.

They are versatile tools with an over-all capacity of from No. 8 to 4 1/4".

They require no more than the proper chasers to cut either right- or left-hand threads. No extra equipment is needed.

They are easy to install and simple to handle. For almost half a century J&L Dies and Chasers have been the answer to a multitude of threading jobs throughout the world.



Look at these features that make them leaders in their field and give you better threads at lower cost:

STRENGTH

Every part is of solid steel, hardened and precision ground. There are no built-up sections. Dependability and ultimate capacity are assured.

FLOAT

All models are built with both concentric and longitudinal float.

DUAL-DIAMETER CONTROL LEVER FOR ROUGHING AND FINISHING CUTS

Heavy rough cuts, followed by light, accurate finish cuts can be taken with the same set of chasers by merely moving the roughing attachment lever. This is often a chaser saver on heavy, coarse pitch jobs, especially where short chamfers are a requirement.

SIZE ADJUSTMENT

The external micrometer adjusting screw provides simple and precise setting to exact pitch diameter. It is easy to set and maintain sizes well within your thread tolerances.

RAPID CHASER CHANGE-OVER

Chasers are removed for resharpening, or size replacement, by merely removing the front cover of the Die. No tools are required. Change-over is a matter of seconds — which means more hours available for production.

Write to Dept. 710 for illustrated catalog and complete information.

Die Head Division

JONES & LAMSON



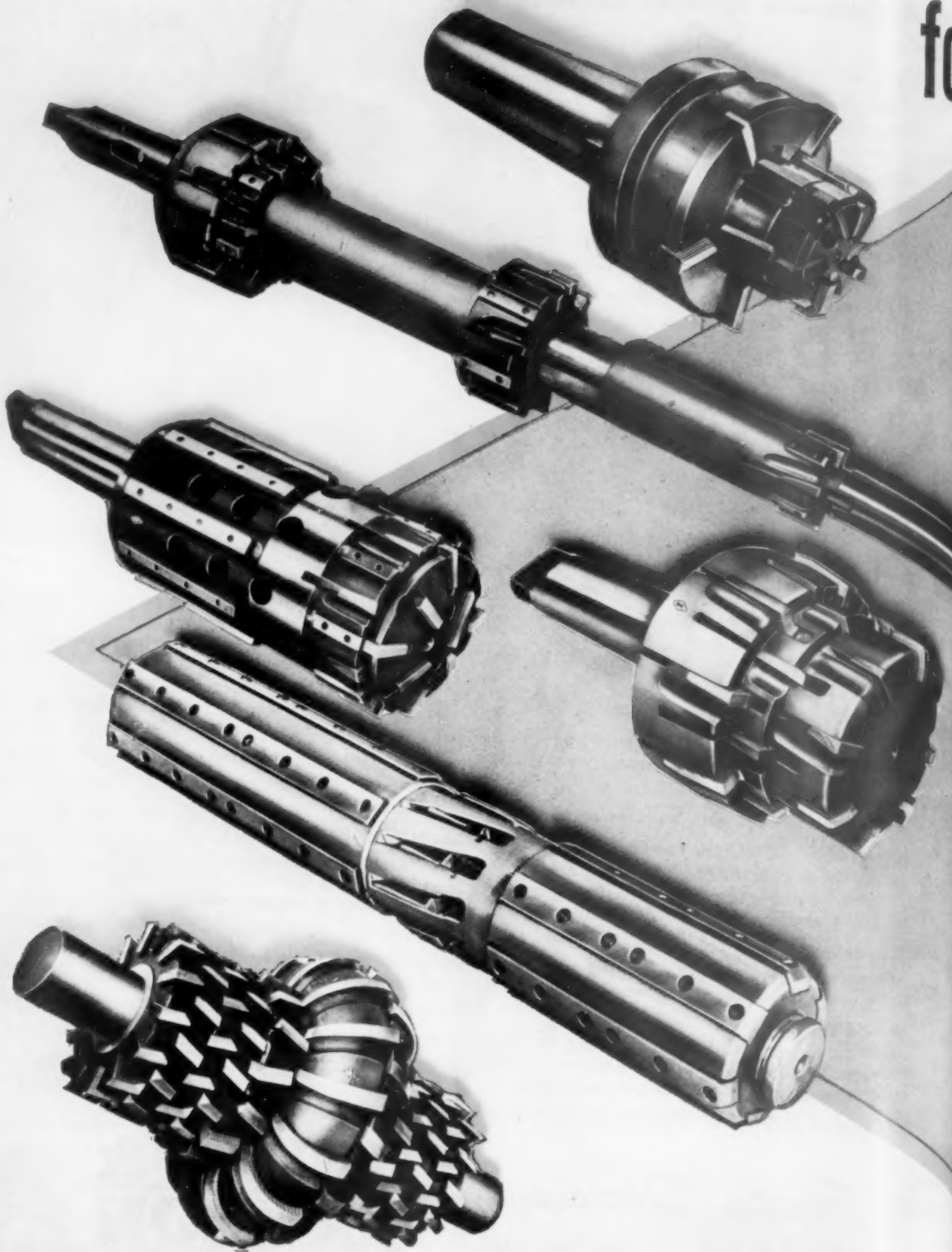
MACHINE COMPANY
Springfield, Vermont, U.S.A.

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287

modern milling for



cutters modern milling machines

multiple diameter milling with carbide

With properly designed carbide cutters you can make two, three and more cuts with one pass of the tool, remove four to twelve times as much metal compared to high speed steel cutters. To realize the full benefits of this high productivity, your milling machine must be in tip-top condition and take the accelerated speeds and feeds without vibration or backlash. The workpiece must be rigid and anchored close to the table.

On the left is a group of typical OK tools for multiple cutting with either high speed steel or carbide blades. OK cutters are sound in basic design. The simple, two-piece construction—body and blades—is the ultimate in strength, power and efficiency. Blades, once set, are immovable, and yet come out with a drift in a jiffy. They are easy to re-grind and replace.

OK is backed by an experience of 50 years . . . engineering thousands of carbide milling and boring tools.

On request we would be glad to send you the latest edition of Catalog 13 entitled "Modern Milling Cutters For Modern Milling Machines."

The



Tool Company, inc.
MILFORD NEW HAMPSHIRE

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STANDARD PRODUCTS

TOGGLE CLAMPS

QUICK • POWERFUL

Preferred for many years by leading manufacturers and reputable engineering companies, Wolverine Toggle Clamps are available in a variety of styles and sizes.



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TOGGLE
CLAMP

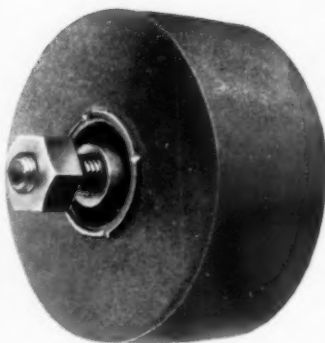
CQ-1100
SERIES
TOGGLE
CLAMP

C-130
SERIES
TOGGLE
CLAMP

WOLVERINE CONVEYOR ROLLERS

Neoprene Sponge

Wolverine Rubber Conveyor Rollers are made of an oil and abrasion resistant Neoprene sponge rubber, supported on dual ball bearings and mounted with a standard 1/2" bolt and nut assembly.



WOLVERINE SAFETY TONGS

LIGHT • DURABLE

Designed to embody all of the elements essential to safe and efficient punch press feeding, Wolverine Safety Tongs are light, strong, and durable.

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WOLVERINE TOOL CO.
1486 E. Woodbridge Detroit 7, Mich.

A reliable source for special tools, fixtures and machinery parts.

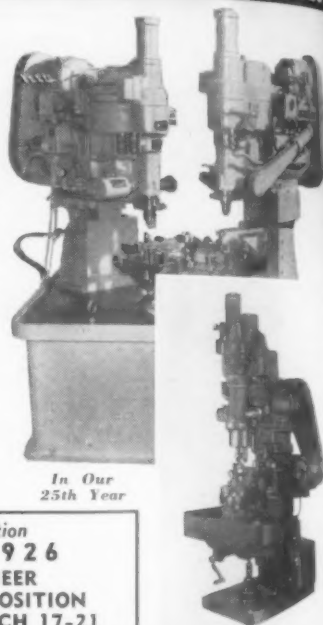
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KAUFMAN

TAPPING MACHINES

BUILT FOR SPECIFIC PRODUCTION JOBS

Kaufman specializes in Tapping Machines — every machine precision-built to meet the requirements of individual production jobs. Designed with fully automatic cycle — single or multiple spindle heads—speed changes by selective gearing — and other most advanced features. Write for complete information.



In Our
25th Year

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SPACE 1926
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INDUSTRIAL EXPOSITION
CHICAGO — MARCH 17-21

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in diamond tools..

P.S.M.

MATRIX

makes the difference!



Precision Steel Matrix holds the diamond firmly, wets it and adheres to the diamond under rough, as well as normal usage.

P. S. M. has the same coefficient of expansion as the diamond. This matrix expands and contracts at the same rate of speed as the diamond and anchors it permanently in the tool. The P. S. M. will prevent the diamonds from shattering and perishing before they render you maximum service.

For tools that dress sharper and assure you of longer wheel life, insist on Precision Diamond Tools, manufacturers of a complete line of dressing tools and wheels for every purpose.

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Write today for catalog!

PRECISION DIAMOND TOOL CO.

102 South Grove Ave. ELGIN, ILLINOIS

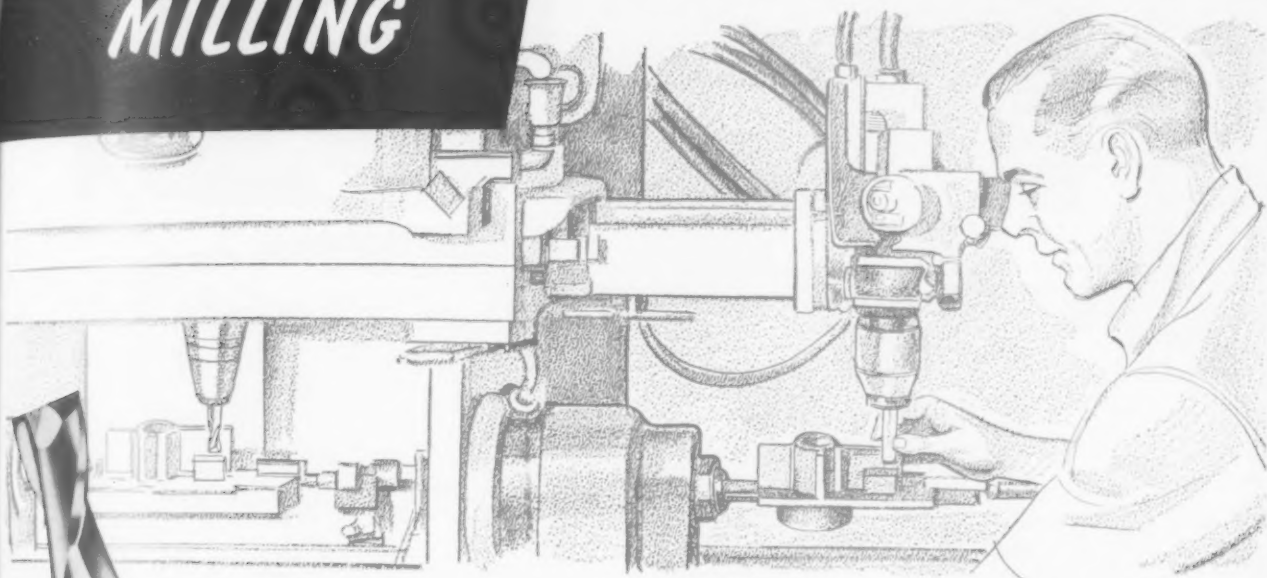
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The Tool Engineer

Here's a tip on...

HIGH SPEED MILLING

WITHOUT LOSS OF SURFACE FINISH



A series of tests on a template follower job, illustrated above, proved conclusively to the user that *Cleveland* End Mills have two outstanding features:

- 1—They possess *unusual chip clearing ability*.
- 2—They permit the use of higher speeds and feeds than other mills *without loss of surface finish or tool life*.

More than two years ago the entire line of *Cleveland* End Mills was completely redesigned. Since that time they have been tested repeatedly in customers' plants—and always have been found superior in chip clearing, accuracy, strength, durability, long life and cutting speed. ♦ If you have not experienced the many advantages of these tools, we urge you to . . .

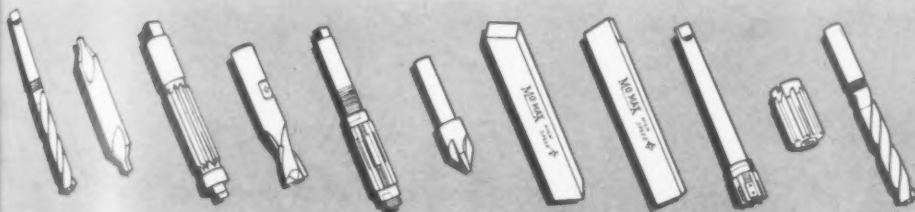
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ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS

Eclipse Counterbore

Booth No. 526

(PRECISION CONTROL HALL)



Here's an exhibit number to remember—and a cordial invitation to visit us at the ASTE Exposition. We'll be fully manned with factory executives, engineers and sales personnel to chat or "talk shop" with YOU.

In addition to a complete line of famous Eclipse products, we have a surprise, even for you veteran tool users. We're not announcing our latest product development until the Exposition—ask us about it there!

ECLIPSE COUNTERBORE CO.

Founded in 1913

DETROIT 20, MICHIGAN

65

TRANSMISSION CASES, REQUIRING 12,780 MACHINE OPERATIONS, COMPLETED IN 1 HOUR WITH 4-UNIT BAUSH TRANSFER LINEUP --

There's no doubt that today's answer to high speed, high quality, economical production is a BAUSH TRANSFER LINEUP.

Send us your production problems with blueprints of work. Baush Engineers will give you their recommendations. There is no obligation. Wire, phone or write us today.

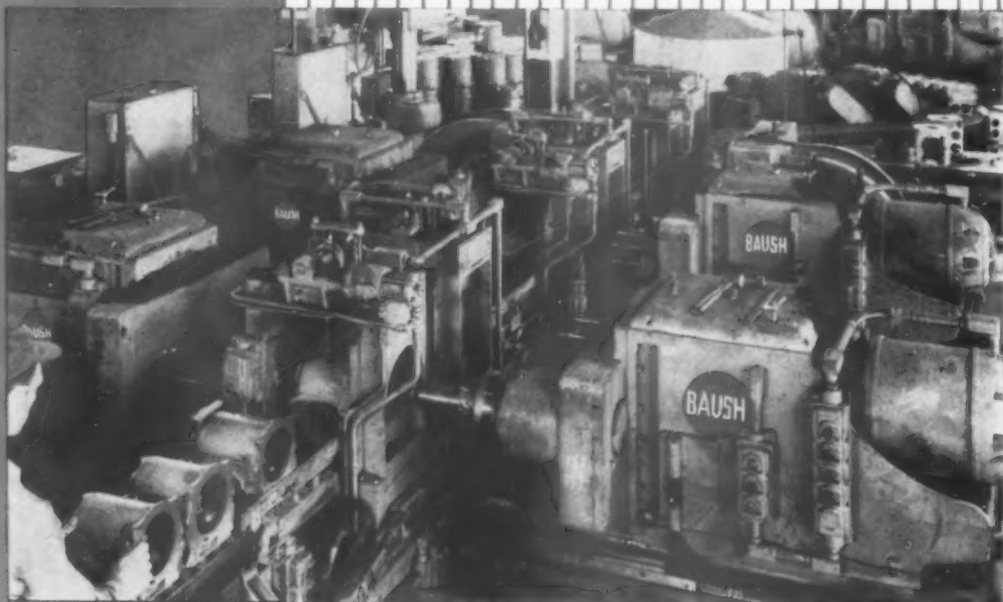
Conveyor carries casting to Baush 2-Way Horizontal Drilling Machine with 5 automatically indexed working stations. This unit drills, reams, countersinks and spot faces 38 holes in top and bottom faces. Parts then enter 2 Baush Automatic Transfer machines separated by a 6-station, indexing type "pancake" machine. First 6-station Baush Transfer with hydraulic, multi-spindle heads feed 57 spindles into work. This unit drills, reams, countersinks, counterbores, rough and semi-finish bores, and taps front and rear faces.

"Pancake" machine then drills 8 angular oil holes in bottom face. 2nd Baush Transfer unit with 10 stations operating 95 spindles, drills, reams, bores, counterbores, rough and semi-finish bores and countersinks remaining holes in casting. Before entering 9th and 10th stations casting automatically rotates 90 degrees to allow tapping of holes in bottom face.

B
BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

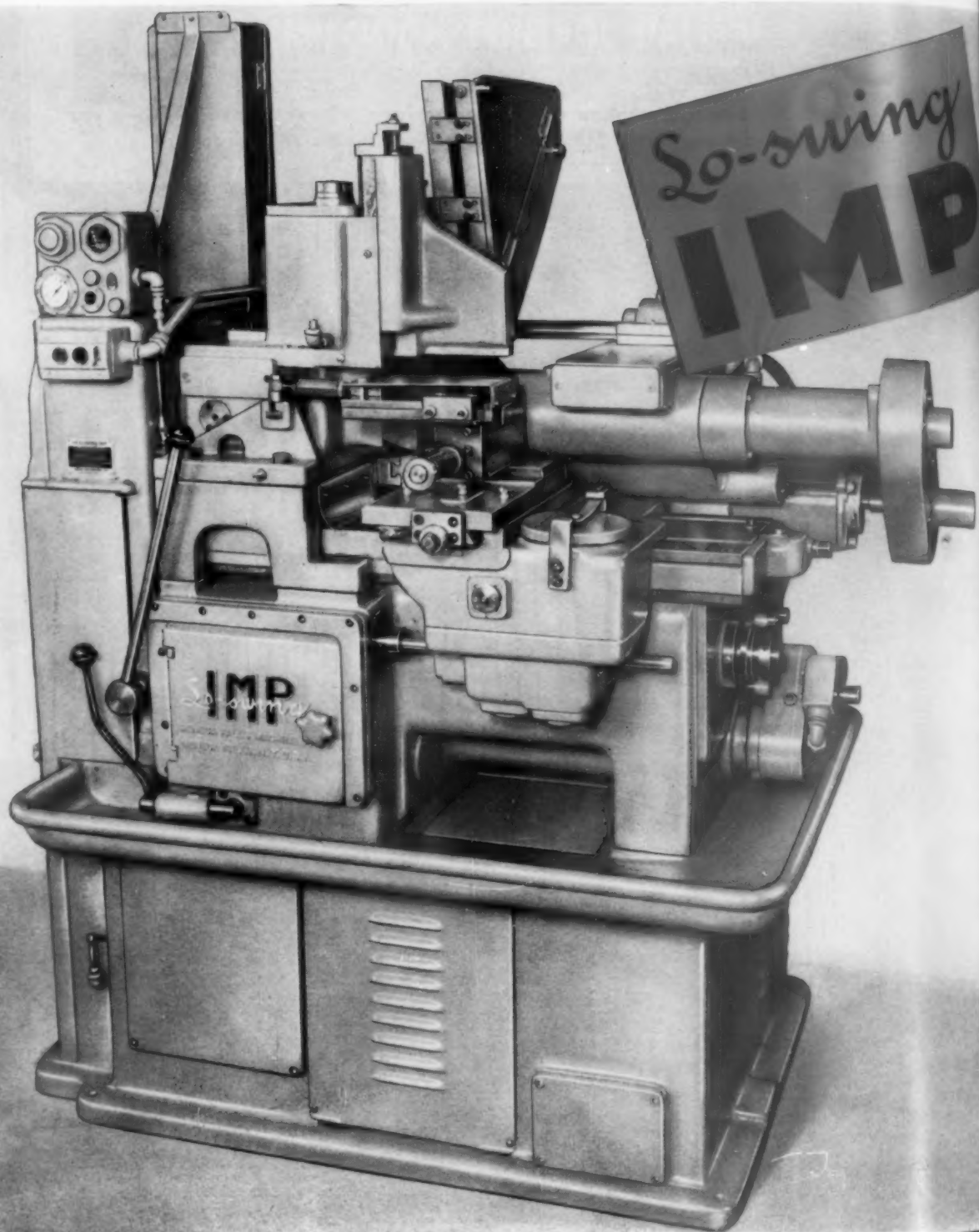
Output:
65 Transmission
cases an hour.

Loading end of
BAUSH 3-Unit Trans-
fer Lineup described
above.



MACHINE O

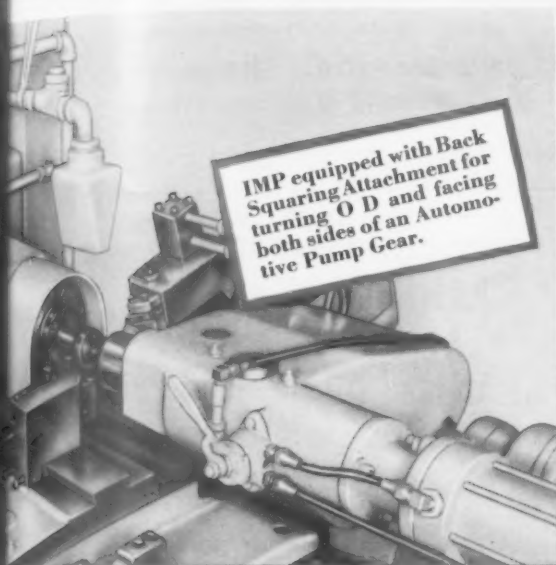
A VERSATILE AUTOMATIC LATHE FOR SMALL WORK
DEMANDING HIGH SPEEDS & EXTREME ACCURACY



PRODUCTION COSTS

THE MONTH

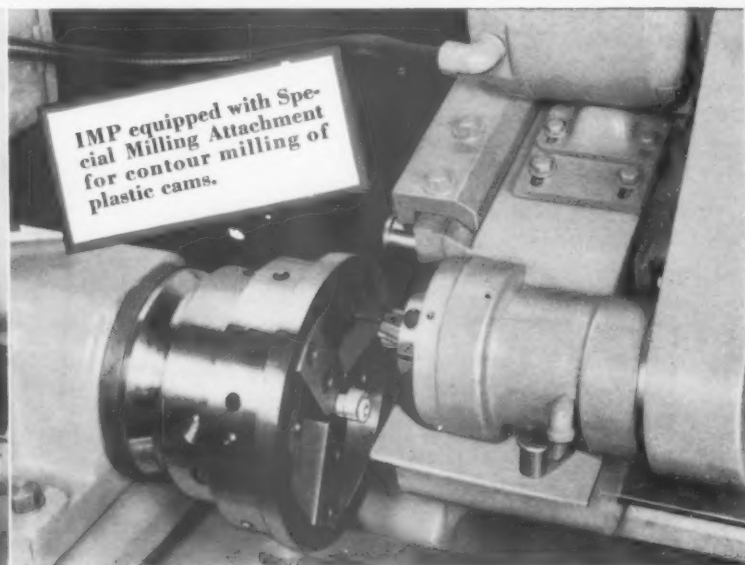
PRODUCED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



The Lo-swing IMP Automatic Lathe lends itself to practically unlimited tooling possibilities. Illustration on opposite page shows an IMP equipped with Third Slide and Rotary Type Automatic Loader for turning automobile valve guides. The close-up views above and below show typical applications of standard and special attachments

to the base machine which have resulted in increased production and lower costs.

If you have a production turning job requiring high speeds, fine finishes and extreme accuracy, write for IMP Bulletin No. N-50. Seneca Falls engineers will be glad to assist you with any of your turning problems.



SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

ARE LOWER WITH Lo-swing

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CLEAN?

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to know about
Metal Cleaning

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are hardest
to remove?

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☐ pigmented drawing compounds
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PNEUMATIC.

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PIONEER TOOL ENGINEERING, INC.

12901 YUKON AVE.

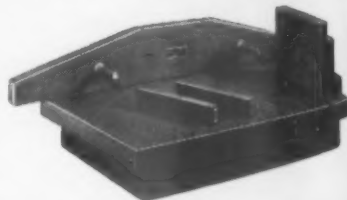
HAWTHORNE, CALIFORNIA

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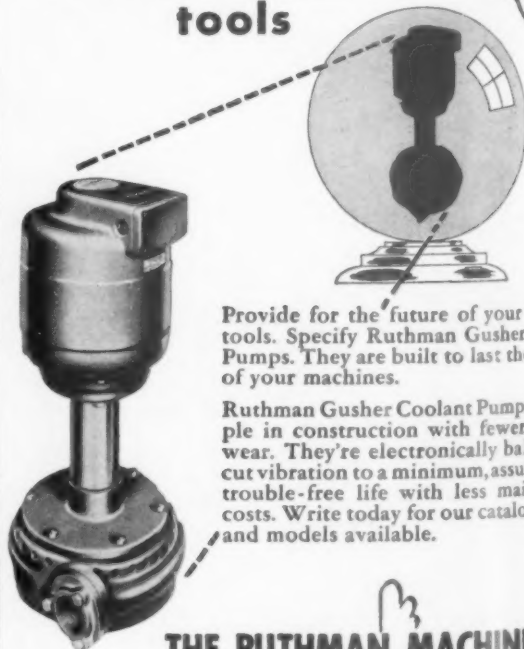
**SURFACE PLATES — ANGLE PLATES — PARALLELS —
STRAIGHT EDGES**

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**FREE RAHN GRANITE SURFACE PLATE CO.
TRIAL! 635 N. Western Dayton 7, Ohio**

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A look at the FUTURE of your machine tools



Provide for the future of your machine
tools. Specify Ruthman Gusher Coolant
Pumps. They are built to last the lifetime
of your machines.

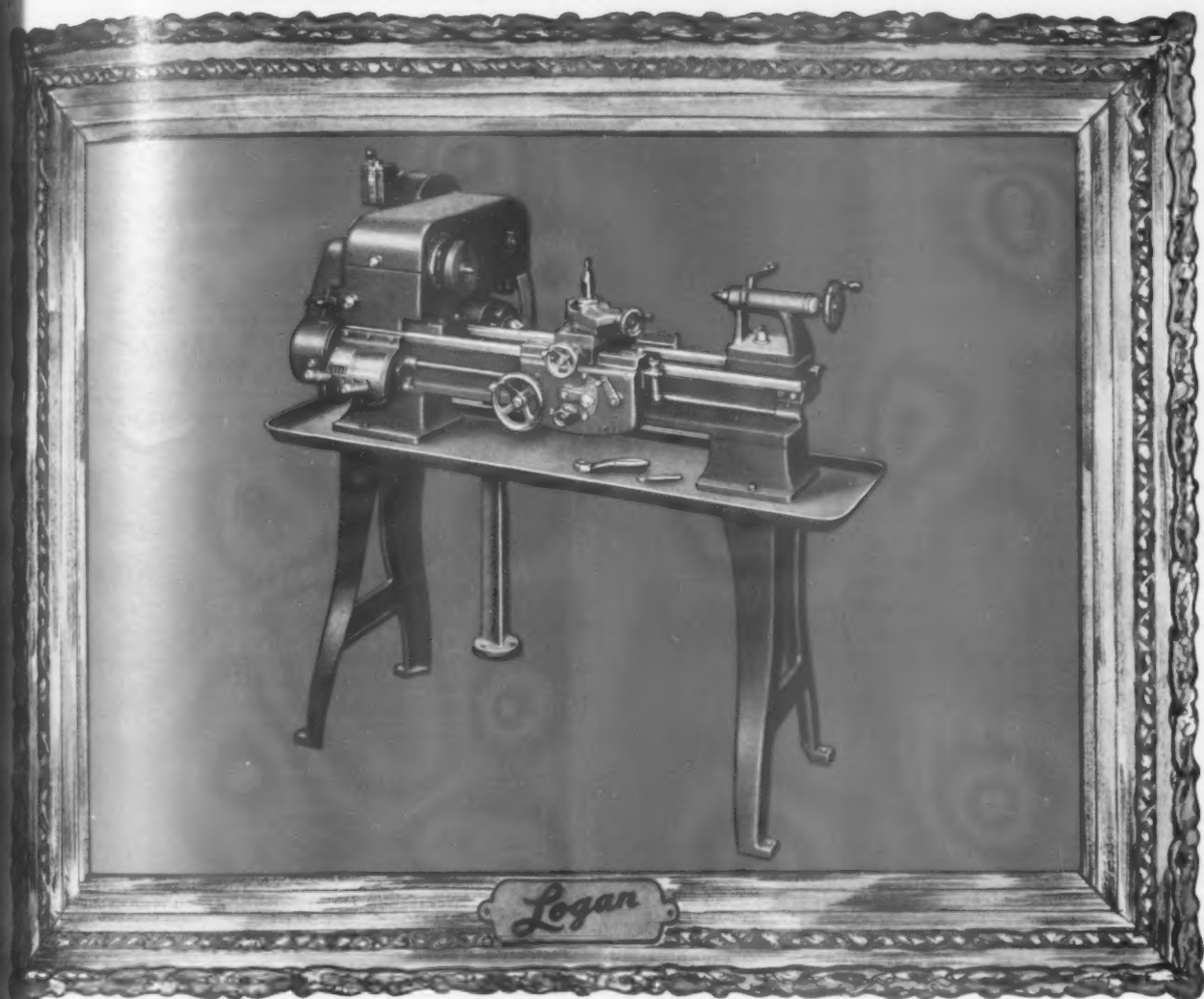
Ruthman Gusher Coolant Pumps are sim-
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cut vibration to a minimum, assuring long
trouble-free life with less maintenance
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THE RUTHMAN MACHINERY CO.

1810 Reading Road, Cincinnati, Ohio

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The Tool Engineer



THE PICTURE OF VERSATILITY

A *Logan* LATHE

Accurate in Every Lathe Operation

With Logan Lathes you are ready for every type of lathe operation. Heavy cuts, tool room precision jobs, high speed production runs and large volume second operation work are all routine Logan assignments. Versatility is inherent in the Logan ball bearing spindle with its wide speed range and sustained accuracy; in the accurate, rugged overall construction of Logan Lathes; and in the full line of Logan Lathe attachments. 11" swing, 1" collet capacity and $1\frac{3}{8}$ " spindle hole are typical of the speci-

fications which make these accurate Logans capable of handling a high percentage of any shop's lathe turning. Easy to set up, simple to operate, frugal with power and durable, Logan Lathes economize every way you use them. In fact, no other lathe of comparable specifications can match the Logan in economy.

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LOGAN LATHE AND
SHAPER CATALOG

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.

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Logan 920
Quick Change Gear Screw Cutting
Lathe 11" Swing, 1" Collet
Capacity, $1\frac{3}{8}$ " Spindle Hole 24"
and 36" Between Centers





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DIAMOND DRESSER

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Why?

Because, sixty-three years of experience in handling Industrial Diamonds has aided in developing Diamond Tools to their present high degree of utility. This improved Tool performance means economy.

Because of their experience, our field engineers have been called upon to solve many of industry's industrial diamond problems. Consider this, when you have problems where a J. K. Smit Engineer can be of help.

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our nearest office for prompt attention.

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How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

BUSHINGS MADE IN FOLLOWING SIZES:
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MACHINE TOOLS
HAVE CUT PRODUCTION COSTS
FOR AMERICAN INDUSTRY



DRILLING
BORING
HONING
TAPPING and
Special Machines



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Reduce ALIGNMENT COSTS!



Types to fit
any machine
used for
tapping or
reaming.

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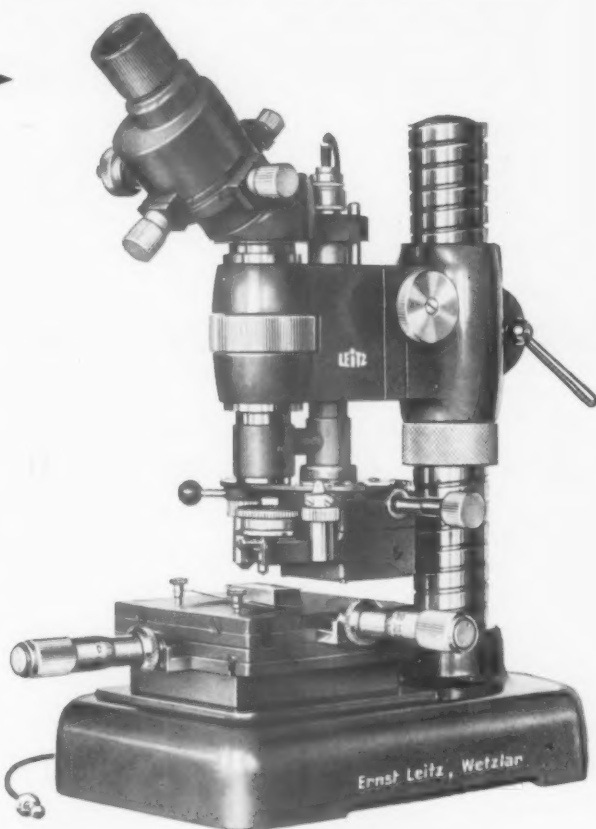
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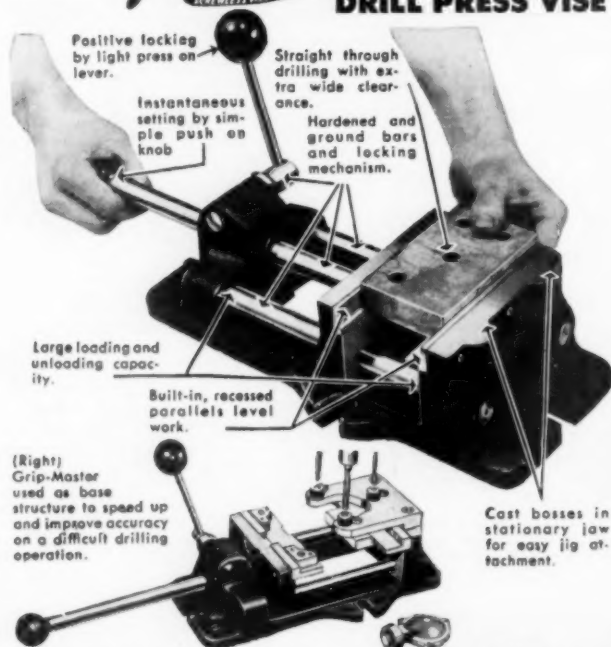
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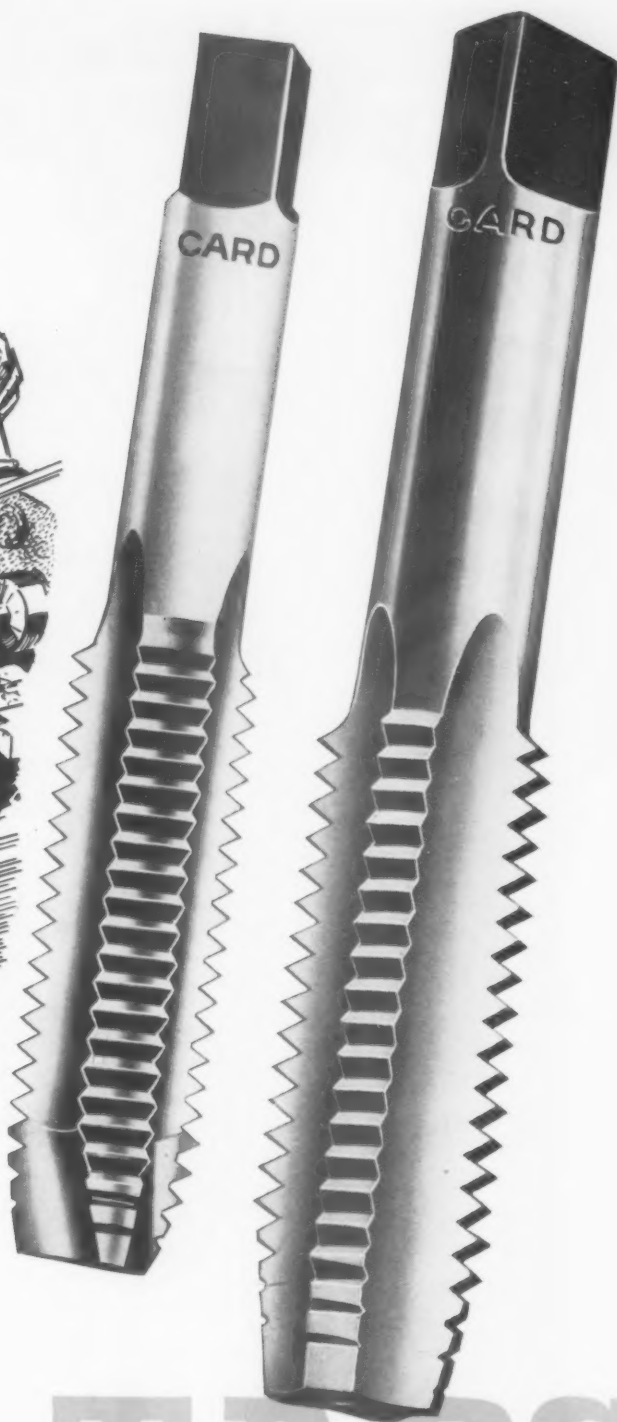
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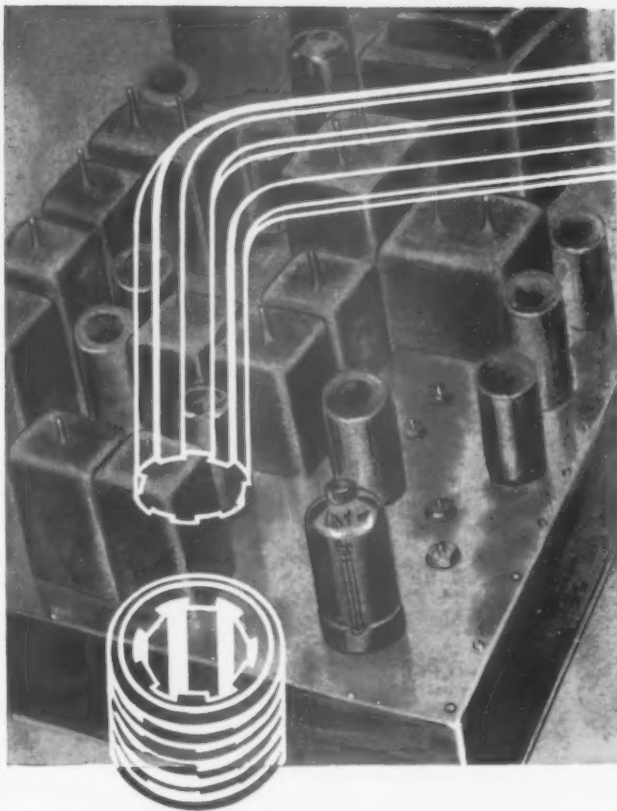
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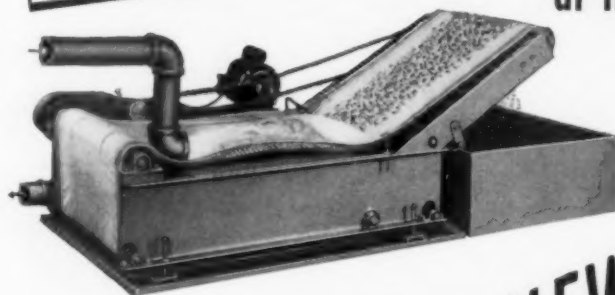
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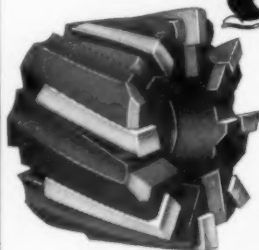


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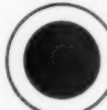


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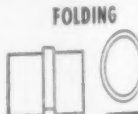


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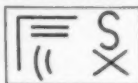
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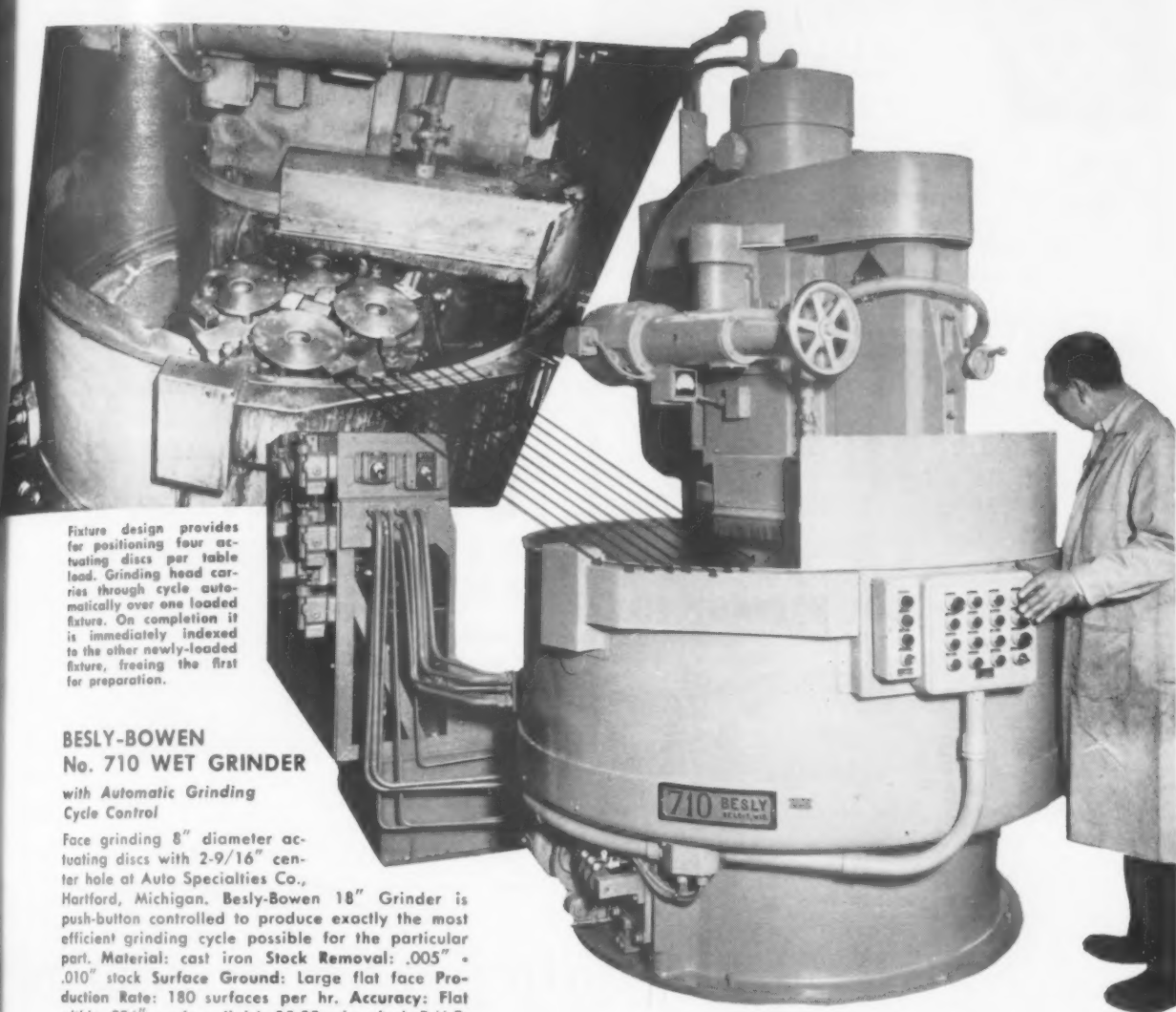
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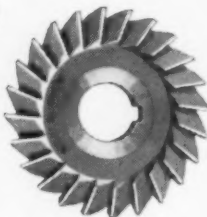
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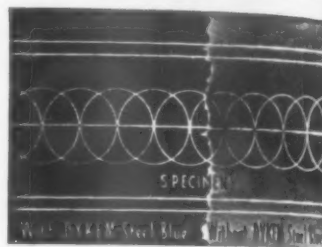
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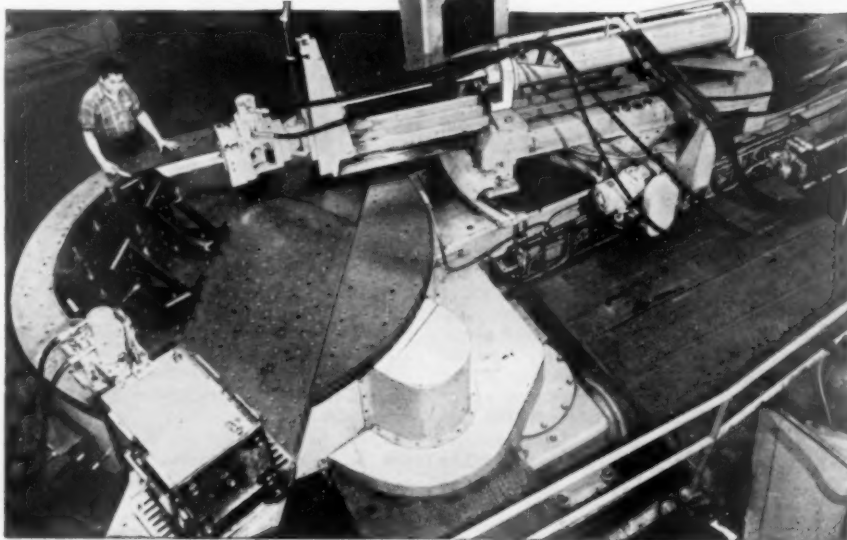


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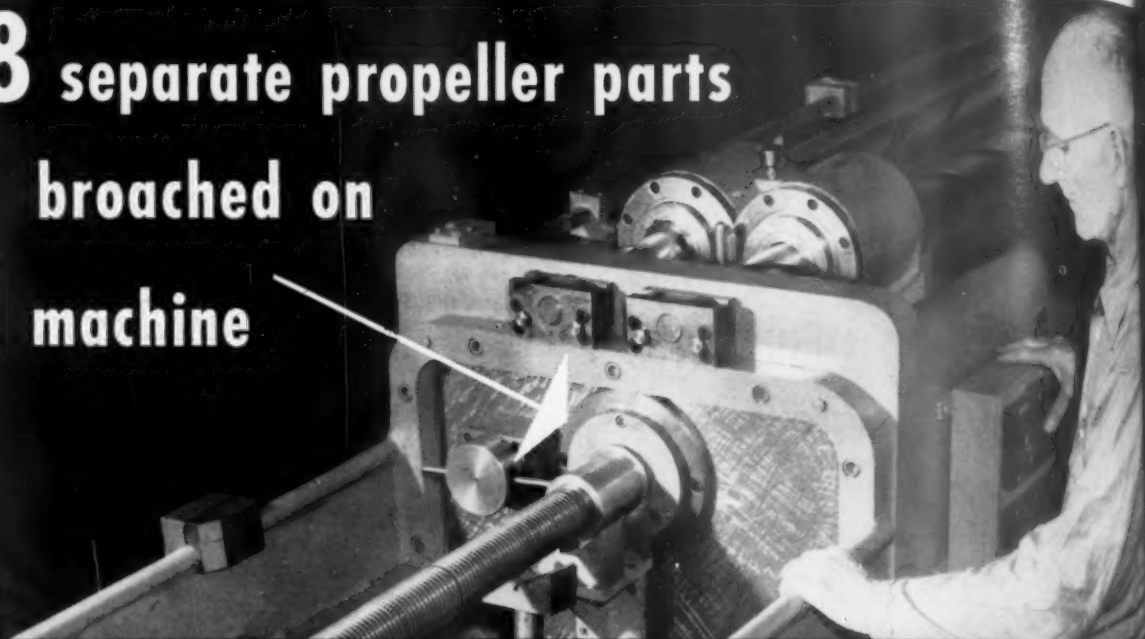
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March, 1952

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Newly Created Machine Tool WITH 3 DELTA DRILL UNITS

Solves Jet Engine Production Problem

- Machine is "universally tooled"—quickly adjustable to unlimited variety of drilling patterns....change-over in a few minutes.
- Drills, reams, countersinks at one set-up. • Drills easily checked for sharpness, changed quickly.

When no conventional machine was sufficiently flexible for handling a wide variety of drilling patterns in axial-flow gas turbine engine production, Pratt & Whitney Aircraft engineers designed one—using three Delta Air Powered Hydraulic Drill Units.

These three drill heads, operating as a single machine tool, produced immediate benefits. Elimination of special jigs made it possible to have absolutely accurate dimensions in each part produced—thus insuring interchangeability of the close tolerance component parts. In addition, definite production economies were effected by elimination of costly jigs and fixtures.

... Be sure to see this drill unit demonstrated at the **ASTE** show — March 17-21, International Amphitheatre, 2nd floor, North Hall, Booth 209.

There's a Delta Tool for Your Job—

WOOD OR METAL WORKING

33 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

Another  Product

Here is another of many instances of alert production engineers finding quick solution of knotty machining problems, through application of the Delta Air Powered Hydraulic Drill Unit. Others are described in the Delta Drill Unit Catalog — containing complete specifications and guidance in selecting the right size for your needs.

**DELTA
MILWAUKEE**

DELTA POWER TOOL DIVISION
Rockwell

MANUFACTURING COMPANY

611C East Vienna Avenue • Milwaukee 1, Wisconsin

- ☐ Please send me a new Drill Unit Catalog
- ☐ Please send me address of nearest Delta Drill Unit Representative

Name _____

Position _____

Company _____

Address _____

City _____ Zone _____ State _____

Davis Boring Tool increases facilities to give you even better deliveries



New 30,000 sq. ft. plant will be producing Davis tools for you by mid-year

Here's one manufacturer who's doing something in 1952 to help you out with deliveries on standard and special boring, turning and planing tools.

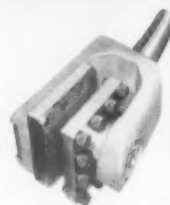
Giddings and Lewis Machine Tool Co., recently purchased a new plant for its Davis Boring Tool Division that will increase production of Davis Boring Tools by 50%.

Now's the time — when deliveries look better — to standardize your shop on "Davis Complete Tooling Service." You can increase your production with present equipment, lower your costs and be sure of sharing in the very latest development in tool design. Write for complete details.



DAVIS BORING TOOL DIVISION

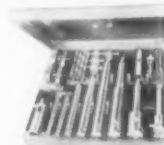
GIDDINGS AND LEWIS MACHINE TOOL COMPANY
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New 8-position tool holder



Block-type line boring tool
Planer and vertical boring mill tools.



Davis Super Micrometer Set
Boring Tool Sets.

See the complete Davis Tool Line



SHOW

BOOTH 1705
CHICAGO, MARCH 17-21

**"WEAR DOWN"
The WELD...
NOT THE OPERATOR!**

grinding and
finishing welds on
stainless steel tank
with a Bayflex Rein-
forced Disc-Wheel, 9" dia.
x 3/16" thick, weight 1 pound.

Formerly this job required a 3½ pound cup wheel for rough grinding plus a sanding disc for finish grinding. This caused operator fatigue and wasteful machine "down-time".

The New Way . . . The Bayflex Way!

Rough grind and finish where required with a single Bayflex disc-wheel in a fraction of the time . . . **EASIER**
. . . **SAFER** . . . **MORE ECONOMICAL.**

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Bayflex® Disc-Wheels

CUTTING ACTION

. . . fast and smooth. Has enough resiliency to hug the work. Capable of rough cutting as well as blending.

DURABILITY

. . . outlasts up to 50 (or more) ordinary sanding discs. Withstands a lot of rough usage.

RESILIENCY

. . . a degree of deflection is possible . . . a great safety factor.

TECHNIQUE OF USE

. . . Apply to work at an angle of approximately 35° using the weight of the machine for pressure. Maintain full speed for most efficient operation.

OTHER APPLICATIONS

. . . Weld removal on angle iron, pipe, or other structural steel. Mill scale removal. Chamfering metal preparatory to welding. Smoothing down flame cut edges. Light snagging, deburring, blending and finishing soft, non-ferrous materials.



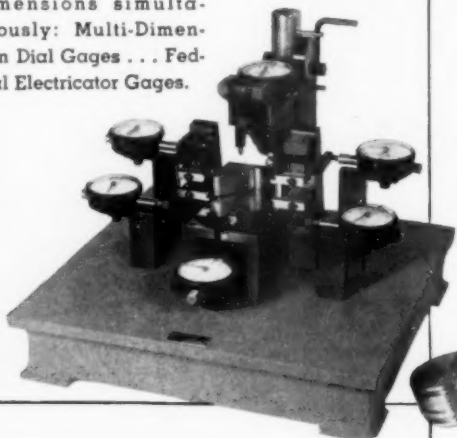
Send for information-packed "Big Three" catalog. It contains mounting instructions, recommended speeds, charts, applications, etc.

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There's a Federal Dial Indicator for every gaging requirement — over 80 different models, ranges, sizes, graduations, styles. Also Dial Indicator Gages in regular and special designs — for all dimension-control jobs: snap, hole, thickness, caliper, comparator, etc. Gages for inspecting many dimensions simultaneously: Multi-Dimension Dial Gages . . . Federal Electricator Gages.



AIR GAGES

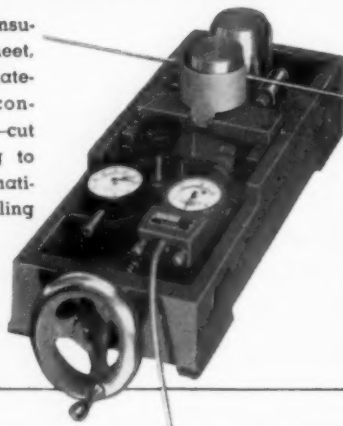
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Glass tubing, bare wire, insulated wire, steel rods, sheet, and similar continuous material is gaged and size-controlled or chart-recorded—cut sections sorted according to requirements — all automatically. Gages for controlling grinders and other production machines.



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High speed, completely automatic from machine to package. Semi-automatic or hand fed. Inspect multiple dimensions. Anything from ¼" diam. balls to—what's your sorting problem?



See them

AT BOOTH 733 • SOUTH HALL • A.S.T.E. SHOW

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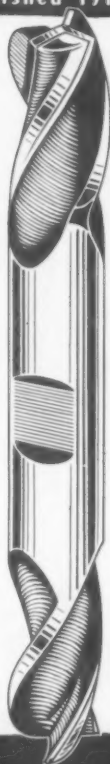
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Arrow's engineering skill and production experience gained during 36 years as a major supplier of precision tooling is your assurance of custom quality, prompt service and superior performance.

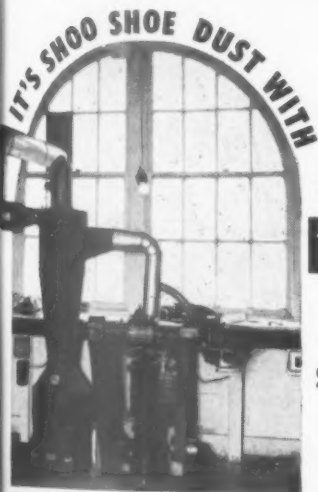
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THIS TORIT DUST SEPARATOR

Here is an installation involving a heavy volume of dust and lint, some of it of a particularly adhesive character. It was solved to the complete satisfaction of the user and the Wisconsin Industrial Commission, with the Torit 19-FM Dust Separator illustrated.

Torit dust collecting equipment connected to individual or small groups of machines possesses many advantages. There is little or no idle running time. No maze of piping obscures lighting arrangements, and pipe line friction is practically eliminated. Neither is there any interference with production set ups.

Whether your dust problems are large or small it will pay you to take those problems to:

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P. S. Also ask for the New Torit Catalog.



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DOOR FASTENER**
The sturdy and efficient door fastener used on Torit cabinets is available for use on your own products. Strike plate either flat or angular. Write for quantity prices.

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CHICAGO, MARCH 17-21

- Discuss your fastener problems.
- Get the latest priority information.
- See the complete Mac-it line, plus many specials, sold through leading industrial distributors.
- You'll find a real welcome whether you're one of Mac-it's old friends or are "just looking".

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MAR. 17

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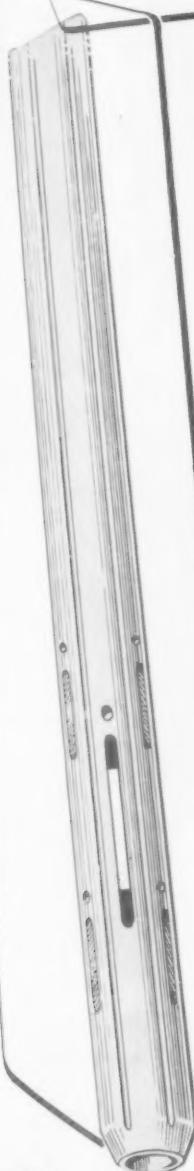
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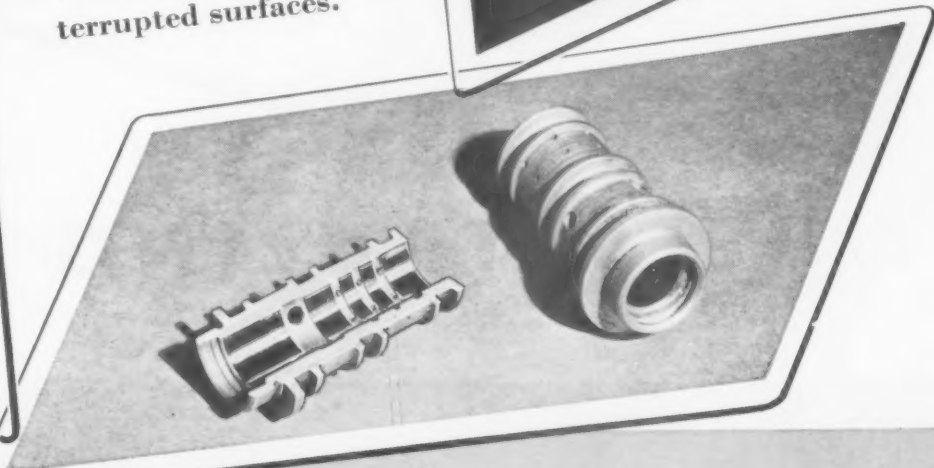
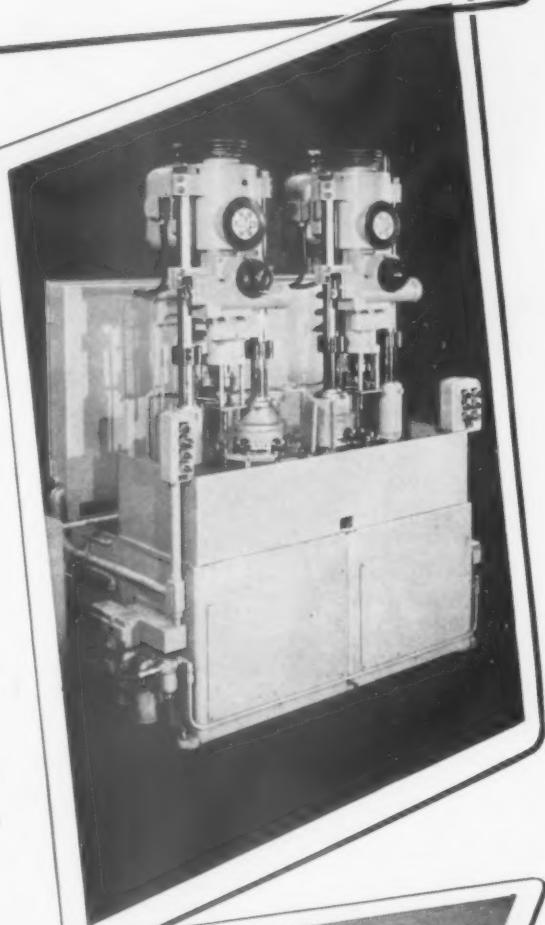
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in Hydraguide steering control
generated by Microhoning



Hardened steel valve sleeves held to .0002" tolerance for size, geometry and alignment. Edges of control surfaces made sharp and clean.

New guided type MICROMOLD tool and MICROHONER machine makes possible the productive generation of these precision tolerances in hard, interrupted surfaces.

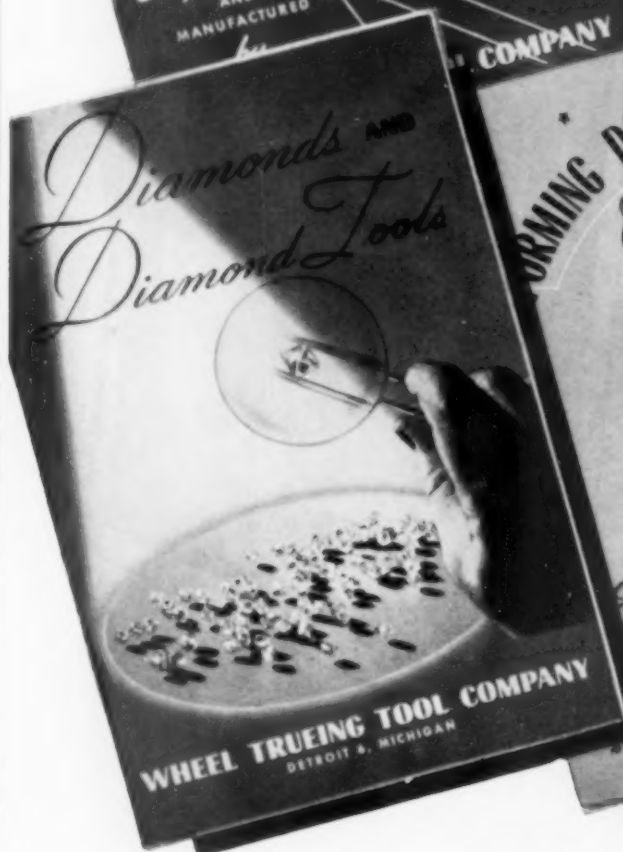


For complete information on
MICROHONING Interrupted Surfaces
write for
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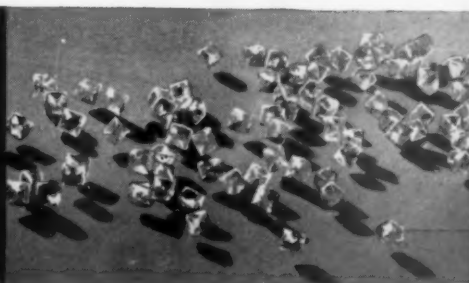
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So You Want to Make a **MILLION?** *... then follow this procedure*

- ① Get CARMET carbide metal dies and equip your presses with them.
- ② Make 1,000,000 small stampings a day with only *one* grind per day.
- ③ Save \$56,907 annually by using Carmet, as shown in the following cost comparison:

WITH CARMET	WITH HI-CARBON, HI-CHROME
★ 4½ Dies per year.....\$30,600	★ 22 Dies per year.....\$ 46,750
★ Punch Replacements per year.....\$(none)	★ Punch Replacements per year.....\$ 6,600
★ 260 Grinds per year.....\$14,560	★ 4,420 Grinds per year.....\$ 47,424
★ Diamond Wheel Cost per year.....\$ 792	★ Abrasive Wheel Cost per year.....\$ 2,085
ANNUAL COST WITH CARBIDE....\$45,952	ANNUAL COST WITH FERROUS...\$102,859

- ④ Make millions *more* precision pieces a year than you could with hi-carbon, hi-chrome dies!

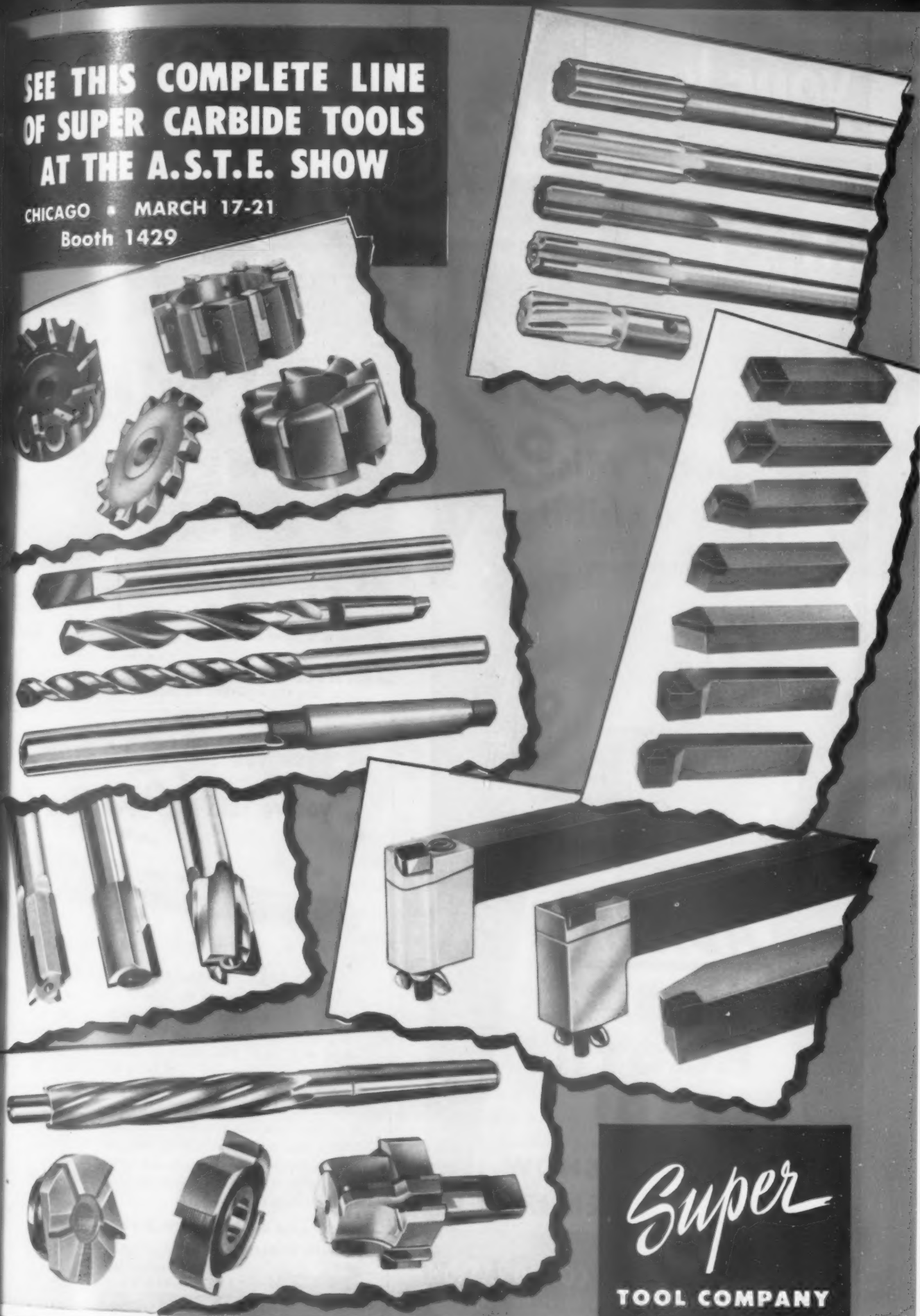
Ask the Carmet representative to figure out the potential savings and increased production for you in terms of your own work. • Allegheny Ludlum Steel Corporation, Carmet Division, Wanda & Jarvis Avenues, Detroit 20, Michigan.

For complete **MODERN** Tooling, call
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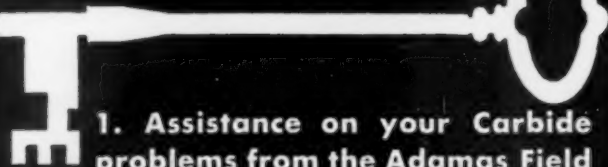
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ASTE TOOL SHOW
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PRODUCERS OF TUNGSTEN CARBIDE TOOL TIPS, DIES AND WEAR PARTS

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SAVES TIME, TAPS, LABOR

The finest hand tapping machine made. Visual, direct reading depth gauge shows exactly how deep tap is in work. Prevents broken taps.

In use in hundreds of shops, universities, experimental rooms and government agencies. Good fits, right angle holes, tapped to correct depth, with no tap breakage, are easily achieved with this machine.

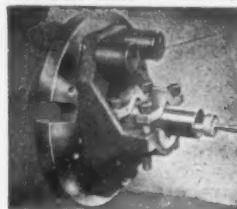
CAPACITY:

Machine tap adapters $\frac{1}{8}$ " to 1". Pipe tap adapters $\frac{1}{8}$ " to $\frac{5}{8}$ ". Button die adapters $\frac{3}{8}$ " to $1\frac{1}{2}$ ".

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Quick, accurate set-ups on lathes, jig borers, milling machines, grinders and drill presses. Guaranteed accuracy .0005 in 3". Made of finest cast iron, normalized for accuracy. Round steel insert hardened and ground. Recess in "Y" for objects with heads. Holes for work stops. Eccentric counter weights for quick, accurate balancing.



Capacity $\frac{1}{8}$ " to 2"
Size: 7" long, $4\frac{1}{2}$ " wide by 3" high
Weight: 81 $\frac{1}{2}$ pounds
Finished in black crackle lacquer

MODEL R

\$49.00

Set-up on Model R for turning or grinding. Two bolts through base fasten Work Holder firmly to face plate.

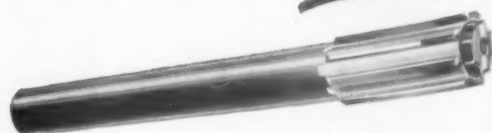


MODEL P with rotating swing clamp ideal for production **\$67.00**

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LASSY TOOL COMPANY, 94 Bohemia Street, Plainville, Conn.
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you've said *Quality!*



WHEN you put a Staples Carbide-Tipped Expansion Reamer to work you prove for yourself our point about Staples quality.

Staples is the Expansion Reamer with the solid steel body, (not split) which assures rigidity and accuracy. Furthermore, a Staples Reamer is made to exceptionally high precision standards, assuring close tolerance on hole size, and better surface finish.

Every man who uses Staples Expansion Reamers and other Staples circular cutting tools proves their quality in production, in accuracy, and in longer life.

What are your requirements? Our engineers have helpful answers.

See our TOOL SHOW Exhibit, Booth 639

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CARBIDE-TIPPED CUTTING TOOLS

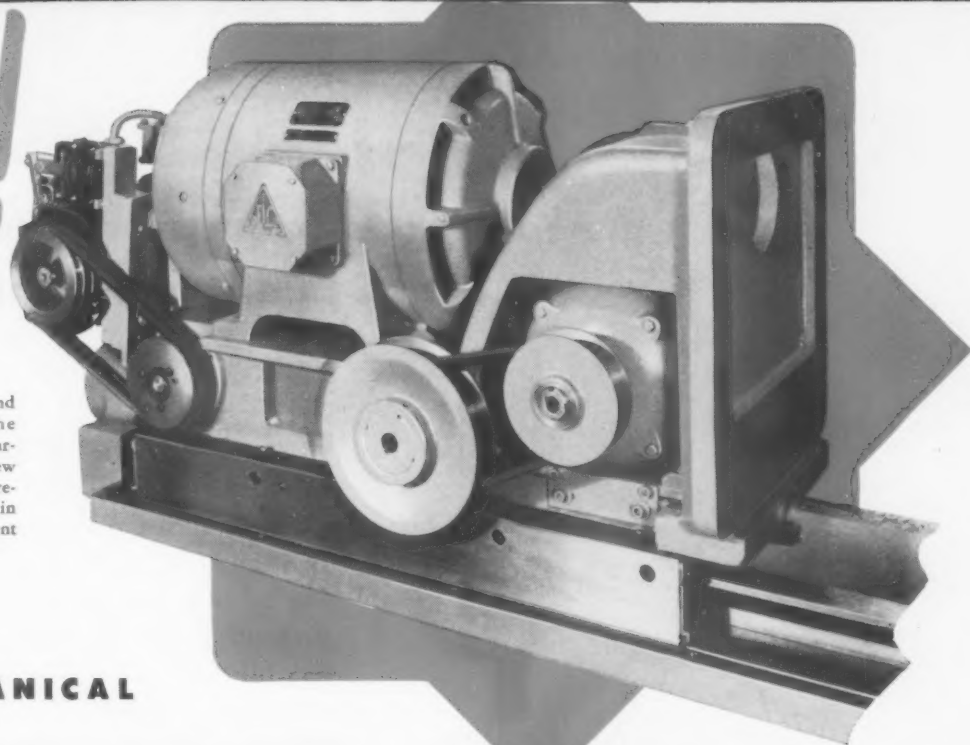
A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers — Special Tools

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The Tool Engineers

Rehnberg-Jacobson

NEW!



NOTE: Suitable guards and protective covers for the motors and sheaves are furnished regularly on this Screw Feed Unit. They have been removed for this illustration in order to show the arrangement of operating elements.

ALL-MECHANICAL

SCREW FEED UNIT

- **RAPID TRAVERSE**
240 IN. PER MIN.
- **WORKING FEED ADJUSTABLE**
1½ TO 15 IN. PER MIN.
- **20 H.P. MAXIMUM**
- **20,000 LBS. THRUST**
- **CONFORMS TO JIC**
ELECTRICAL STANDARDS

This new Unit obtains both rapid traverse and feed rates by driving both the screw and a rotatable nut with separate motors. The Rapid Traverse drive is reversible and has a mechanical brake to stop the unit accurately at the end of either the forward or reverse rapid traverse.

The Working Feed drive has adjustable taper sheaves for varying the slow feed rate over a wide range. A conventional heavy bracket provides means for mounting any tool head to be driven by coupling to the main drive motor. The entire unit is mounted on dovetail ways. ● *Thus Rehnberg-Jacobson now makes available to builders of production machinery a compact, top quality, extremely versatile, highly reliable, all-mechanical, self-contained powered Unit for actuating almost any type of multiple or single-spindle production tooling. Full specifications will be furnished promptly on request.*

REHNBERG-JACOBSON MFG. COMPANY

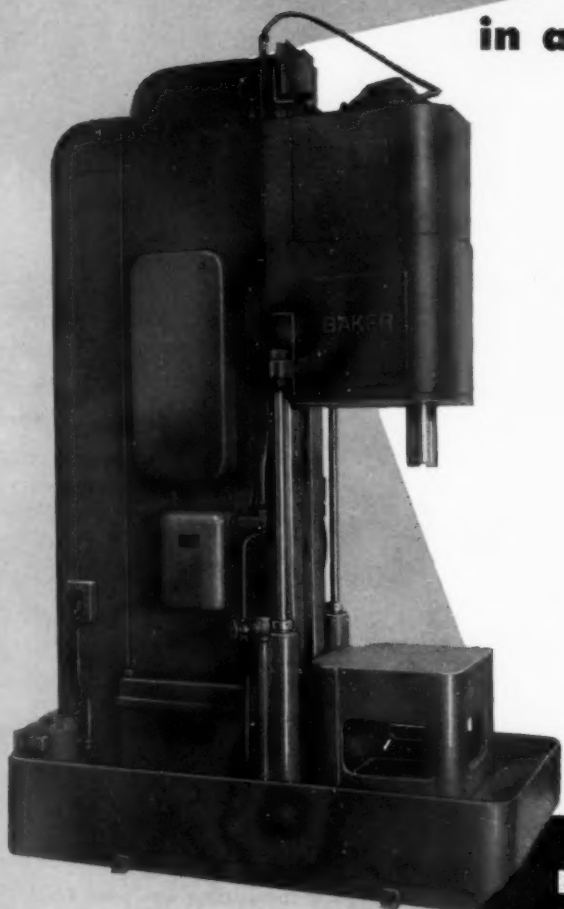
**DESIGNERS & BUILDERS OF
SPECIAL MACHINERY**



**2135 KISHWAUKEE ST.
ROCKFORD, ILLINOIS**

The Versatile **BAKER 36HO DRILL...**

**provides increased productivity
in a multitude of applications!**

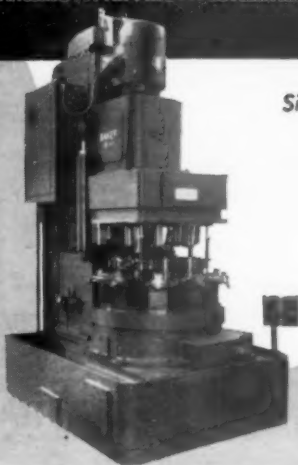


The standard Baker 36HO Heavy Duty Vertical Hydraulic Drill may be adapted to a multitude of multiple or single spindle drilling, boring, counterboring, spot facing or reaming operations. Provision for pick-off speed changeovers gives extreme flexibility of spindle speeds. The machine is of hydraulic saddle type feed and may be furnished with either standard plain table or indexing table with up to six indexing stations. Ample capacity is provided to drive one 5 inch diameter High Speed twist drill, drilling from solid in SAE-1035 steel. Write Baker concerning your specific job problem.

Illustrations show Baker 36HO as adapted for drilling wrench bodies for a leading manufacturer of crescent wrenches. Estimated production rate is 103 parts per hour at 100 % efficiency. Machine is easily converted for operations on varying sizes of wrenches.

BAKER BROTHERS, INC., Toledo, Ohio

DRILLING... TAPPING... KEYSEATING and CONTOUR GRINDING MACHINES



Since 1867...



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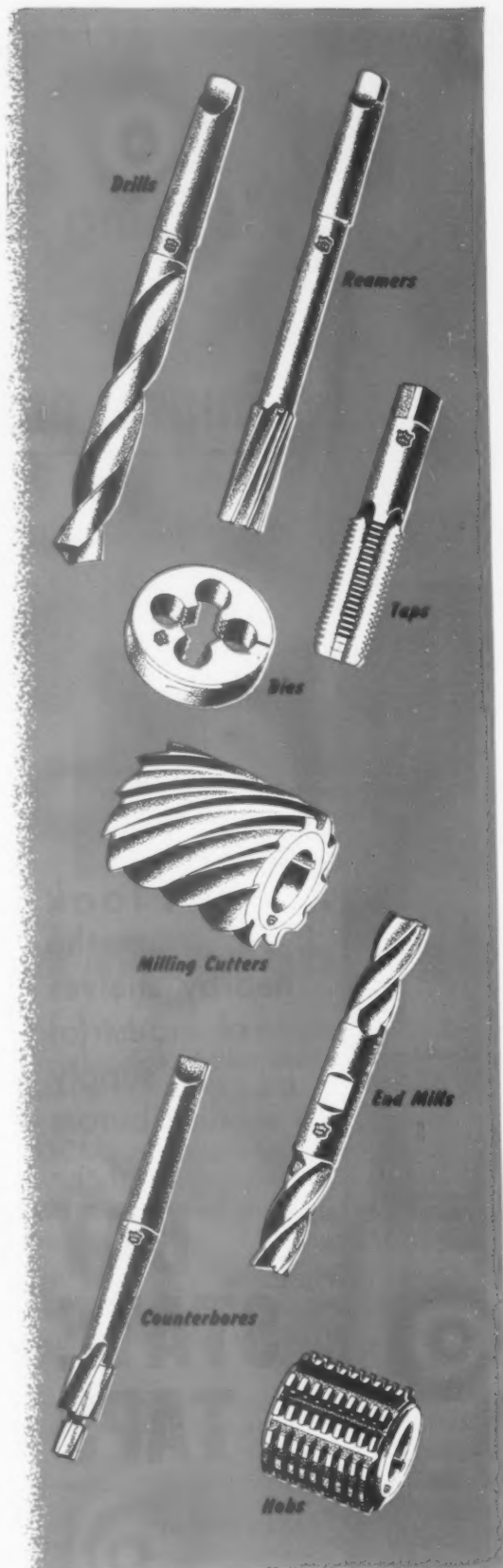
RED SHIELD DRILLS are specified on merit, and used by the mass production industries from coast to coast—automotive—aviation—electrical—farm machinery—railroads.

Foremost quality in design, workmanship and material is one very important reason for this choice.

Service, because of our broad distribution through distributors in over 500 cities, is another reason.

Standard Red Shield Service Men, who have over 70 years' accumulated experience in metal cutting problems to draw on, are an additional strong reason.

These are also good reasons for you to specify and use Standard Red Shield Tools.



STANDARD TOOL CO.

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STANDARDIZE AND SAVE WITH STANDARD RED SHIELD METAL CUTTING TOOLS. STANDARD DISTRIBUTORS IN MORE THAN 500 CITIES CAN SUPPLY YOUR REQUIREMENTS.

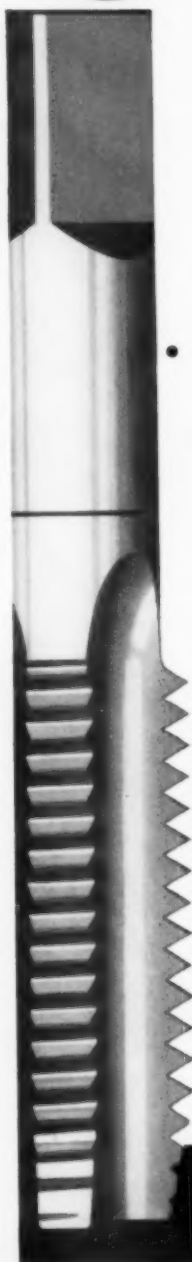
March, 1952

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327



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of industrial
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BAY STATE TAP & DIE CO.
Mansfield, Mass.

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"M·B" Model U·TR UTILITY Pneumatic GRINDER 60,000 RPM



A powerful, fast-cutting tool, streamlined in design, easy to handle. Designed for real production work and the toughest jobs. Precision made, excellent balance. Special grease-sealed bearings . . . no lubrication required. Fitted with steel housing, a special safety feature.

Remember, Built-in Quality remains long after First Cost disappears.

Also other Grinders, Speeds 60,000 to 100,000 R.P.M. Such as to operate Tungsten Carbide Burs, Rotary Files, etc., to full efficiency.

Automatic Air Line Filters, Regulators and Lubricators.

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See us at the A.S.T.E. Exposition, Chicago, March, Booth 1217

M·B PRODUCTS
46 Victor Ave.
DETROIT 3, MICHIGAN

USE READER SERVICE CARD; INDICATE A-3-328-2

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STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch ounces
... inch pounds
... foot pounds
(All sizes from
0-6000 ft. lbs.)



Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. **STURTEVANT CO.**
ADDISON [QUALITY] ILLINOIS

USE READER SERVICE CARD; INDICATE A-3-328-3



SAVES

\$82,507 Per Year

with TOCCO* Induction Hardening

GEARS, shafts, pins, wheels, tubes and bars—almost any size or shape of part—or any metal, too—is adaptable to TOCCO hardening, brazing, annealing or heating for forging.

PRODUCTION UP—Engineers at the Milwaukee Works of International Harvester Company have adopted TOCCO for hardening final drive gears for famous International Harvester farm tractors. TOCCO increases production on the gear shown here from 14 to 35 per hour, 250% faster than conventional heating method, reduces job from a 3 shift to 2 shift operation, even with increased production schedule. Heating time is 35 seconds; oil quench, 60 seconds.



This TOCCO gear machine is powered by a 150 K.W., 10,000 cycle motor-generator set. Photo—courtesy of International Harvester Company.

COSTS DOWN—TOCCO cuts cost—saves \$82,507 per year on application shown above. TOCCO makes possible use of C-1050 A.R.R. steel instead of expensive A-8645-H alloy steel previously required. TOCCO also eliminates shot-blast, formerly needed to remove scale, and extra machining operations that used to be necessary to compensate for distortion.

Gear shown is 18½" O.D., width of face is 2", weight 34 pounds, 73 teeth. Hardness obtained is 55-66 R.C., using 140 K.W. of 10,000 cycle power.

Our Engineers can probably find applications in your plant where TOCCO can increase output and reduce unit costs.

THE OHIO CRANKSHAFT COMPANY



TOCCO

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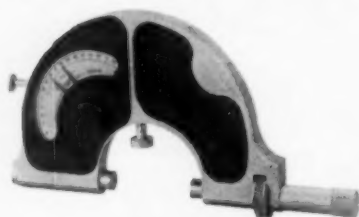
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*for the Most Exacting
Requirements in
Modern Tool Engineering
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Adjustable indicating snap gauge. Scale reads to .0001 in. Range $\pm .0035$ in. Even pressure constantly maintained.



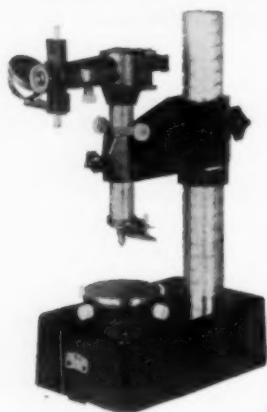
OPTICAL DIVIDING HEAD

New model with precision scale reading to 10 sec. of arc. Sturdy construction — usable on surface grinders and millers. New pre-setting device.



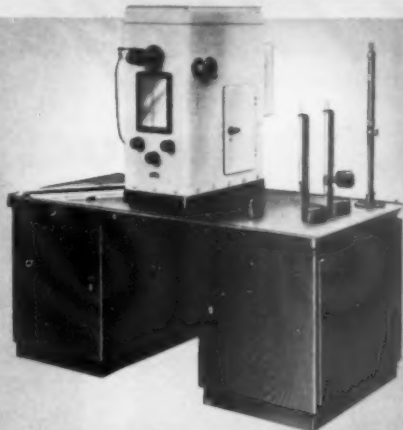
**ABBE
METROSCOPE**

Direct measuring optical instrument. Ultra precision scale and microscope. Measuring range 0 to 200 mm. (0-8 in.) Reads to .0001 in.



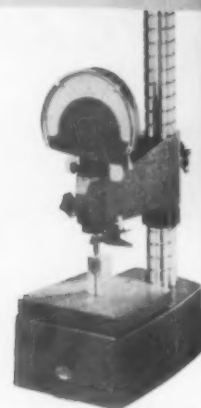
OPTIMETER

An optical precision indicator for checking dimensions by comparison with a standard gauge. Scale reads to .00005 in.



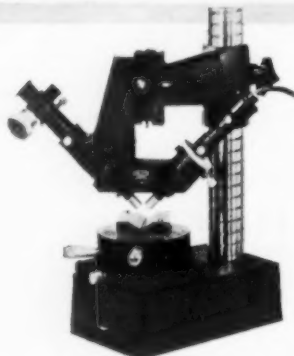
INTERFERENCE COMPARATOR

For absolute and relative measurements of gauge blocks and similar parts. Permits expansion coefficient determinations. Accuracy above .00001 in.



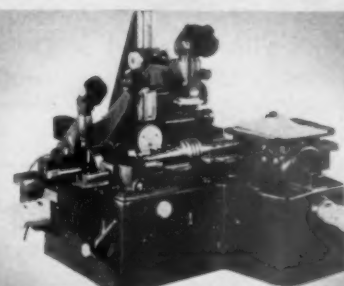
ORTHOTEST

Precision indicating instrument for checking dimensions by comparison with a standard gauge. Scale reads to .00005 in. Range $\pm .004$ in.



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Optical slit microscope. For gauging the form, depth and frequency of tool marks on machined surfaces.



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For any and all types of measurements. Ultra precision glass scales with spiral microscopes. Measuring range: main slide, 0 to 200 mm (0 to 8 in.) Cross slide, 0 to 100 mm (0 to 4 in.) Reads to 1 micron.

**A. S. T. E.
EXPOSITION
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HALL**

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ERCONA CORP.

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With Butterfield Taps you eliminate all risk of getting a defective tap that has been overlooked in ordinary factory spot-checking.

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THE 100% INSPECTED TOOLS

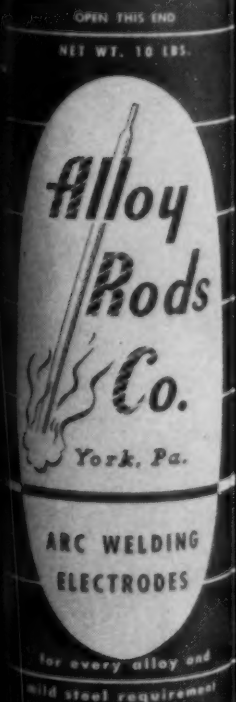
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NO WELDING ROD is better than the skill of the welder using it...but any skilled welder can get consistent *quality* welds, faster and cheaper, using Alloy Rods' seven complete lines.

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ARCALOY for stainless steel
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*Contact your Alloy Rods Distributor or write for specific product Bulletins.

AR-4

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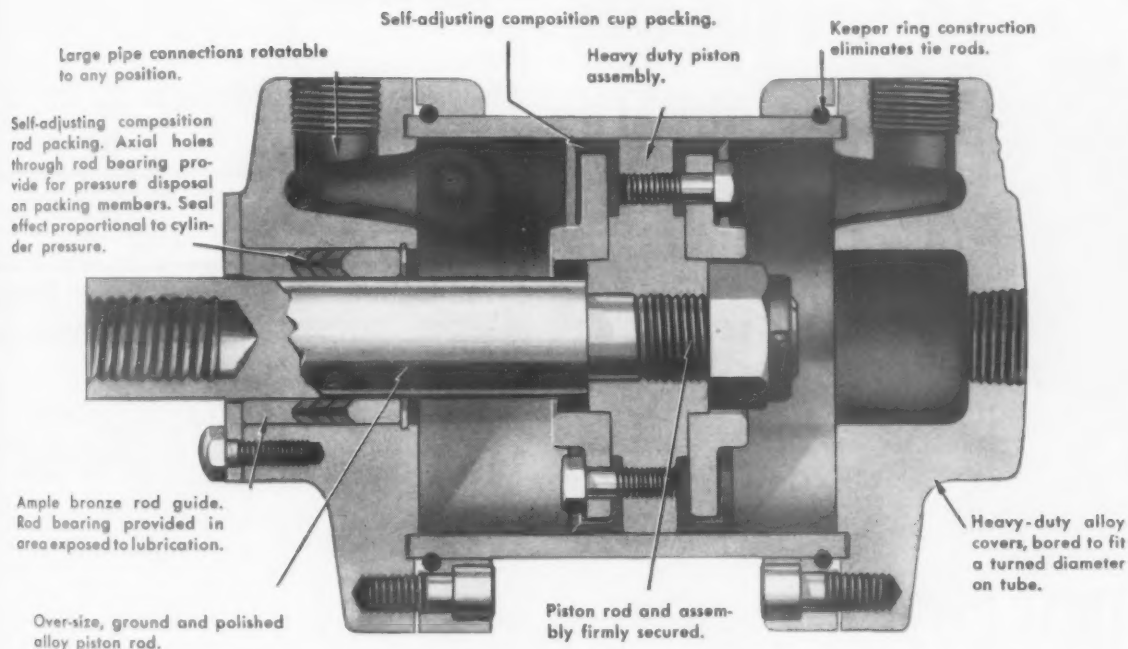
Avoid air power failure!

Choose Rivett Air Cylinders

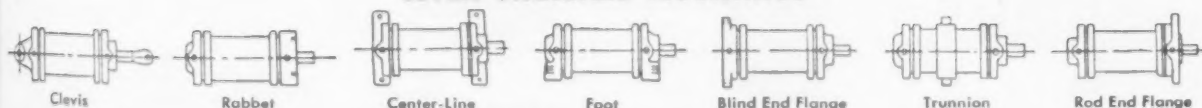
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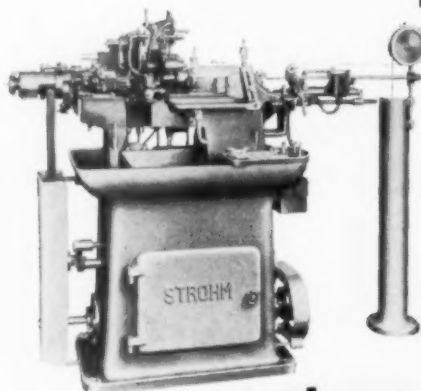


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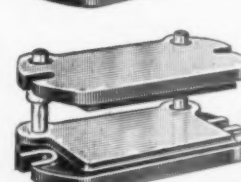
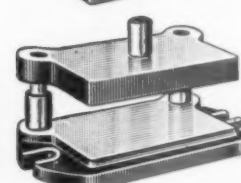
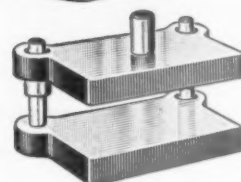
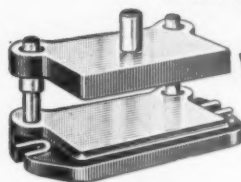
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For Small Work
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- Surfaces precision ground.
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- Leader pins and bushings assembled with cylinder square fixtures assuring accurate alignment.
- Absolute interchangeability between die shoes and punch holders.
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ACME-DANNEMAN CO., Inc.
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The Tool Engineer

MORTON

Fixture Clamps
AND COMPONENTS

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MORTON MACHINE WORKS



BOOST 80 PSI AIR

(Input Range: 40 to 3000 psi Air or Fluid)

TO ... 2000 PSI HYDRAULIC PRESSURE

(Output Range: 200 to 10,000 psi Fluid)



with



Fluid Pressure BOOSTERS

From ordinary plant air line pressure, Miller Boosters produce hydraulic pressures (from 200 to 10,000 psi) for driving one or more hydraulic work cylinders simultaneously at from 30 to 450 strokes per minute. Ordinarily, the booster operates one stroke for each stroke of the operating cylinders.

Used in place of conventional type hydraulic pumps, Miller Boosters save space and weight, permit convenient portability and are easier and less costly to install, operate, and maintain. Also, they hold pressure indefinitely—without the motion and heat generation of ordinary pump circuits.

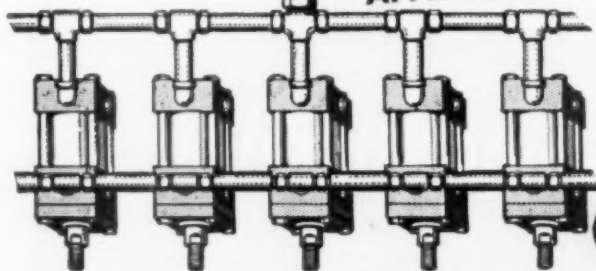
Used in place of air cylinders, the booster driven hydraulic work cylinders which can do the work of an air cylinder ten times as large and heavy, save space and weight at point of application of cylinder thrust—since the booster itself can be mounted separately—away from the hydraulic work cylinders and either on or off the equipment or machine.

In many installations, the popular Miller Dual Pressure "Air Miser" Booster saves up to 95% of the air normally consumed by direct-driven air cylinders.

A wide selection of sizes, pressure ratios and mounting styles are available for the first time at low cost on a normal delivery schedule because Miller Boosters are built up from stock Miller standard cylinder parts to eliminate costly designs, patterns and castings.

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for . . .*

- WELDING
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SIMILAR
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OTHER MILLER PRODUCTS INCLUDE: AIR CYLINDERS, 1 1/2" to 20" BORES, 200 PSI OPERATING PRESSURE HYDRAULIC CYLINDERS, 1 1/2" to 6" BORES FOR 500 PSI OPERATION, 8" to 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1 1/4" to 12" BORES, 2000-3000 PSI OPERATING PRESSURE. MOUNTING STYLES AVAILABLE.



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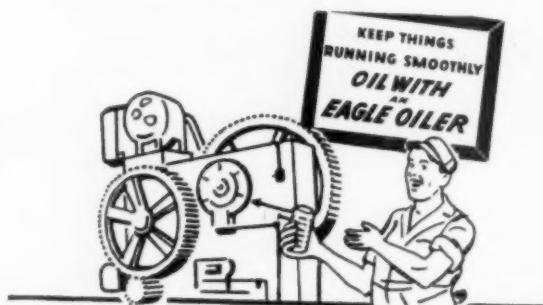
His recommendations are backed by Gorham's unmatched facilities, which include three fully-equipped modern plants,

a large Engineering and Metallurgical staff, and a force of field application engineers in principal industrial centers, coast-to-coast. All are dedicated to furnishing prompt and profitable solutions to your special tooling problems. Gorham-engineered "specials" are turning problems into profits in thousands of plants every day . . . why not let them do the same for *you*? If you haven't met your nearby Gorham Field Engineer, write for his name, or send details of your problem direct for recommendations.

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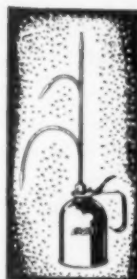
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POWER-TORQUE TOOLS

Manufactured by
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REGISTERED U. S. PATENT OFFICE
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Nothing Like a Slitter

**FOR SPEEDING
PRODUCTION
SCHEDULES**

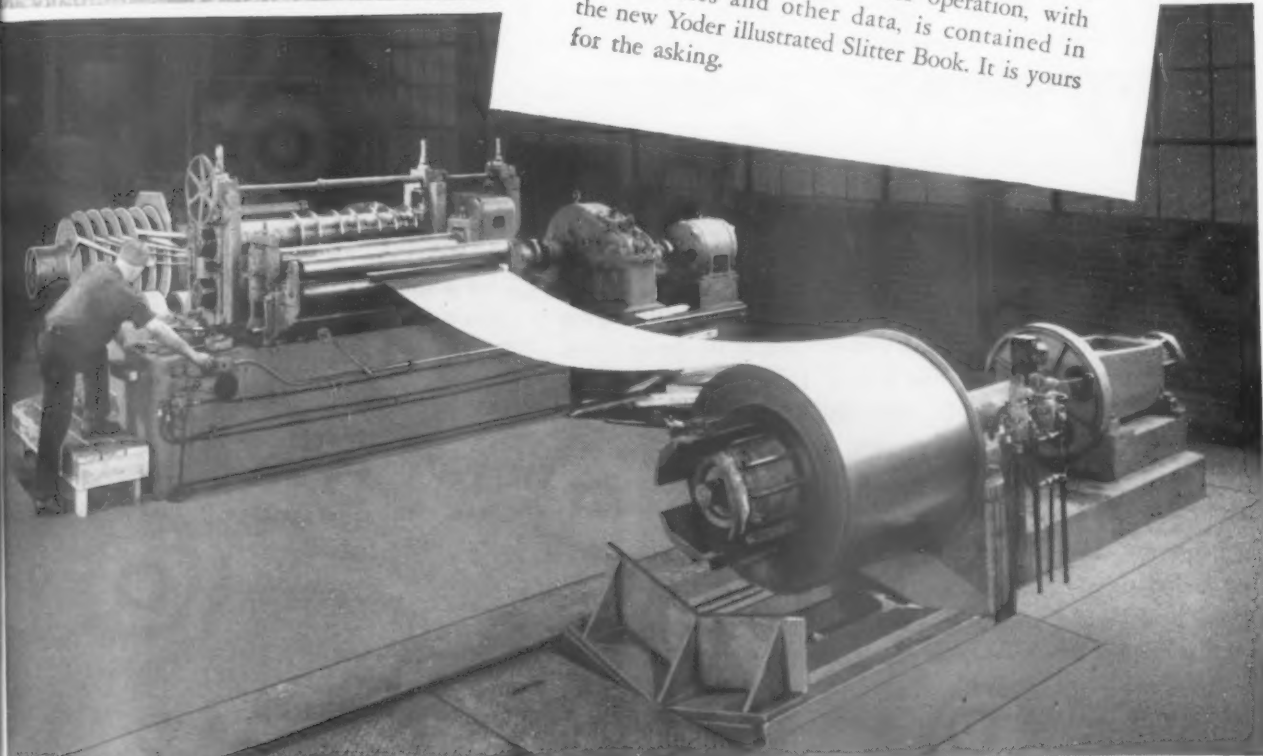
If you have a Yoder slitter you can buy mill-width coils instead of slit strands. Sources of supply of mill-width coils are more numerous, so you can buy wherever you like, at substantially lower prices, and obtain quicker deliveries.

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For requirements as low as 100 tons per month, direct savings alone may be sufficient to repay your investment in a Yoder slitter in the short time of a year.

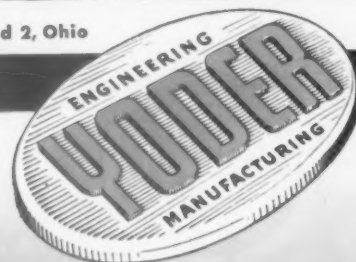
Information on the respective merits of different types and sizes of slitters and accessories, as well as on the economics of slitter operation, with time studies and other data, is contained in the new Yoder illustrated Slitter Book. It is yours for the asking.



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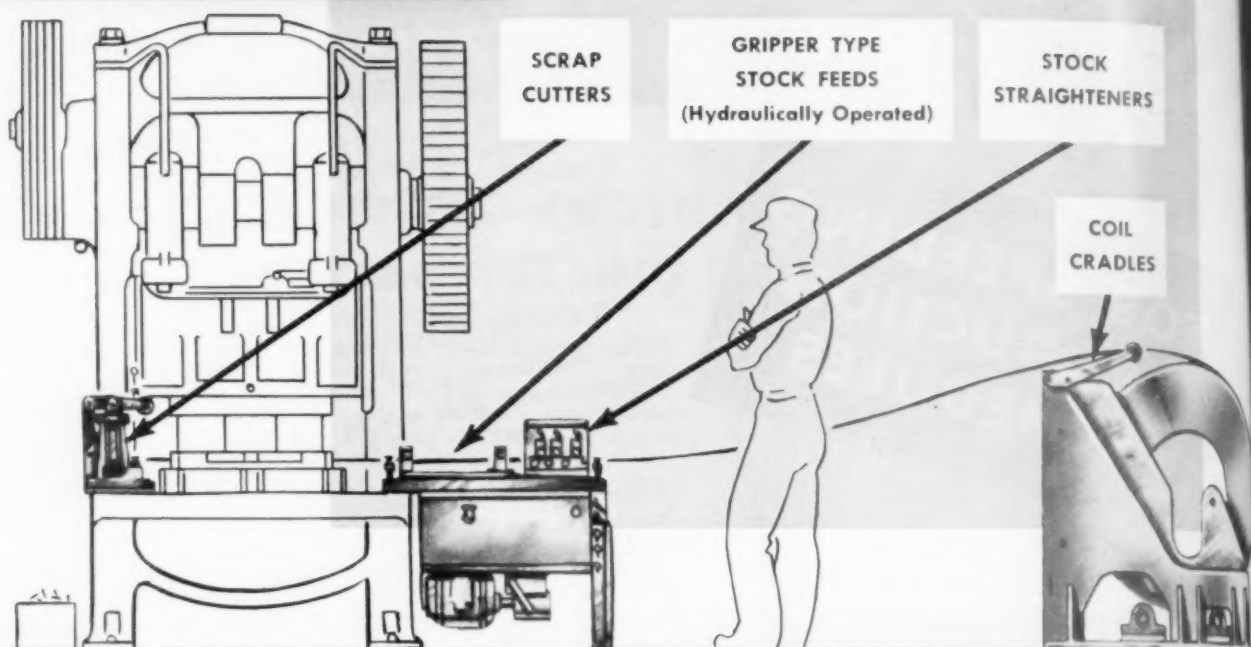
Complete Production Lines

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for Accurate Punch Press Feeding

...THAT SAVES STOCK...REDUCES PRESS DOWN-TIME...FEEDS STOCK FASTER...

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The Sesco Gripper type feed is available in a range of models which provide stroke adjustment from 1/2" up to a maximum of 36" and which handle stock from 1/4" to a maximum of 36" wide.

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March, 1952

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REAMING TWO .0709" HOLES AND TAPPING ONE #00-96 HOLE SIMULTANEOUSLY

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The part is then run through the machine illustrated which incorporates two Govro-Nelson Automatic Drilling Units to ream the previously drilled holes—also one Govro-Nelson Tapping Unit to tap the #00-96 hole, all done simultaneously. The output of each machine is at the rate of 10 pieces per minute.



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MACHINISTS OF PRECISION PARTS FOR 28 YEARS
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**BIG MACHINE
PERFORMANCE**
at Small Machine Cost

Introducing

★ **The NEW Columbia No. 2
Vertical Milling Machine**

The success of the Columbia #1 Milling Machine has encouraged its producers to introduce a new, more versatile mill. The NEW #2 incorporates all the advantages of the #1 plus many NEW features.

For full details, write for NEW 4 page Illustrated Catalog.

Columbia's #2 Vertical Mill helps relieve bottlenecks—cuts shop costs and increases production.

COLUMBIA ENTERPRISES, INC.
Grays Lake, Illinois

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All long-length bushings listed as standard in the Universal Catalog are regular stock items which means speedier delivery to you. If you have been experiencing difficulty in securing long-length bushings, it will pay you to investigate Universal's service. The *super finish I.D.* of Universal Standard Drill Bushings lengthens bushing life . . . reduces tool breakage . . . slashes drill wear.

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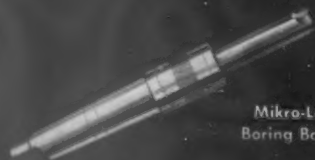
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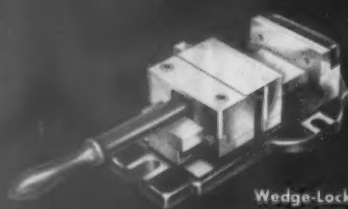
Standard
Collet Chuck



Floating
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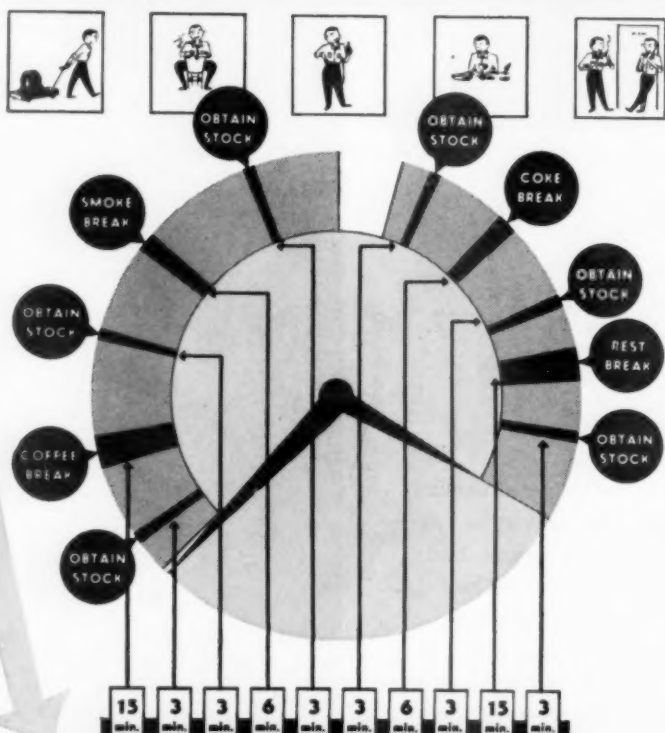
"Kwik-Switch"
Tool Holder



Wedge-Lock
Production Vise

DO YOU KNOW ... that almost
every automatic machine
LOSES ONE HOUR
of productive time
each day?

SAVE
the LOST HOUR
and increase production 12½ to 22% with
PROTECTRON



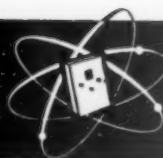
THE LOST HOUR
OF PRODUCTION
DURING A TYPICAL WORKDAY

IT'S A FACT! The time lost while operators leave their machines for morning and afternoon "breaks" and to procure and ready new stock mounts up little-by-little until it reaches at least an hour by the end of the day. That's the **LOST HOUR** . . . the hour during which your investment in plant and equipment produces absolutely nothing. But you can reclaim the **LOST HOUR**. Scores of **PROTECTRON** users have discovered that as **PROTECTRON** monitors . . . machines continue to run, even when unattended. The **LOST HOUR** becomes a productive hour with an increase in output of 12½% to 22%. It's like getting nine hours worth of production from an eight hour shift.

IT'S A FACT! **PROTECTRON** also reduces tool and die breakage as much as 86%

- Saves 300% in manpower, since one man can safely operate four machines, thus releasing three men for other work
- No other device can save your plant so much money . . . so quickly . . . at so little cost • Prove it to yourself. Write for all the facts . . . today.

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2 BIG REASONS FOR SEEING V&O AT THE A.S.T.E. SHOW

SEE US AT
BOOTH
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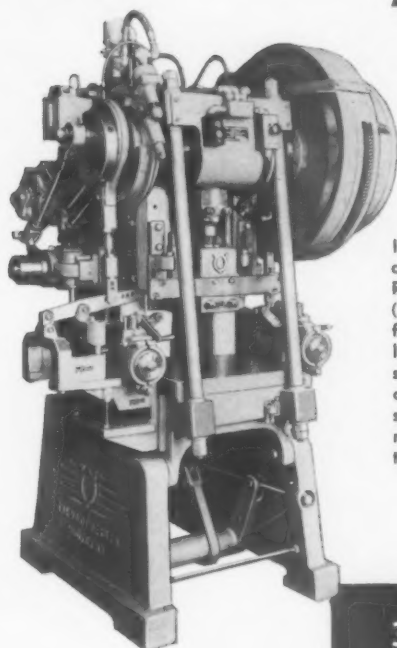
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DIVISION OF EMHART MFG. CO.
HUDSON, NEW YORK

Builders of Precision Power Presses
and Feeds Since 1889

1.

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PRECISION V&O PRESS
DO ITS STUFF**



It will be equipped with air clutch, V & O High Speed Double Roll Feed and Scrap Cutter (Swing-Away Type). You'll get firsthand information on the T-line—it's traditional V & O long slide, heavier over-all weight, and fine machine tool workmanship — and why these features mean longer die life, less maintenance and consistent accuracy.

30T V&O PRESS

2.

**YOU'LL LEARN HOW TO GET
MORE WORK OUT OF YOUR
PRESENT PRESSES**



On display we'll have a V & O Press equipped with the V & O Feed-O-Matic®, the "mechanical hand" power press feeder that boosts secondary die operation production up to 50% — 100% . . . makes operator's job safer and easier . . . increases die life . . . requires no special dies . . . sets up for new work in 1-hour or less.

V&O FEED-O-MATIC



Buy **Bunting** *Bronze Bearings*

When you buy Bunting Bronze Bearings you receive more than just a physical bronze bearing. More than forty years of experience, the technical skill of thorough metallurgists and engineers, the output of equipment designed for closest tolerance and finest finish—these and more are an invisible part of each Bunting Bronze Bearing and Bar.

A sales organization of graduate engineers is able to intelligently

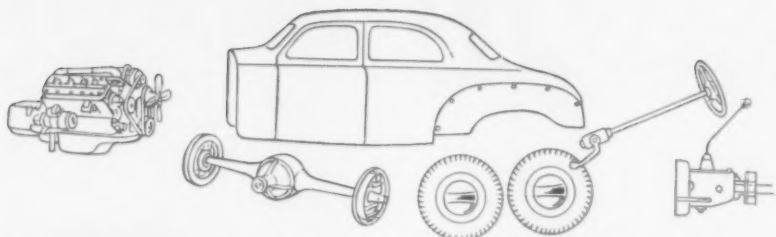
discuss your design and production problems with you. A manufacturing organization that moves swiftly responds to your production schedule on time.

When you buy Bunting Bronze, the entire Bunting organization is alert to the fact that you are a customer and that you want service as well as a product. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities.

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Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS



YOU WOULDN'T buy a car this way

...so why buy hydraulics piecemeal



VICKERS *Custom Built*
HYDRAULIC POWER UNITS

When you buy an automobile you don't make separate purchases of engine, fenders, wheels, frame, axles, gear box, windshield, etc. and try to put them together. You buy a complete car, all in one piece. You don't want the expense and trouble of making the assembly. You do want the undivided responsibility of manufacturer and dealer for the complete car.

Why, then, buy hydraulics piecemeal when you can get a Vickers Custom Built Hydraulic Power Unit? It is built to meet your individual requirements. All necessary pumps, valves, intermediate piping, oil reservoir, motors, controls, etc. are in one self-contained "package." It includes all needed hydraulic accessories such as oil filters, air cleaners, oil level gauges, fittings, etc. Hydraulic connections are grouped in a conveniently located manifold.

The result is simplification of hydraulic design and substantial savings in installation and maintenance costs. Undivided responsibility of Vickers for the entire hydraulic system is an important advantage to both the machine builder and his customer. • Write for Catalog 5000.

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DIVISION OF THE SPERRY CORPORATION

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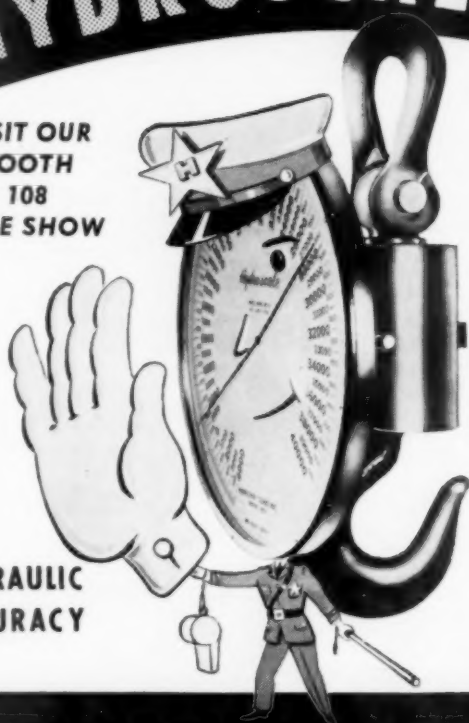
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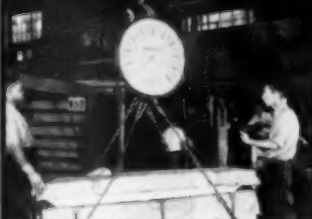
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108
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HYDRAULIC
ACCURACY



A RUGGED—COMPACT CRANE SCALE THAT PROTECTS YOU AGAINST LOSS!



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Check incoming weights at the dock without delay and extra handling

● IN INVENTORY

Avoid transporting heavy bulky material to weighing stations. Speed up the job.

● IN PRODUCTION

Prevent overloading equipment. Batch and measure accurately. Foundries load ladles with even mold pours.

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Scale can be incorporated in tension and load-pulling test equipment.

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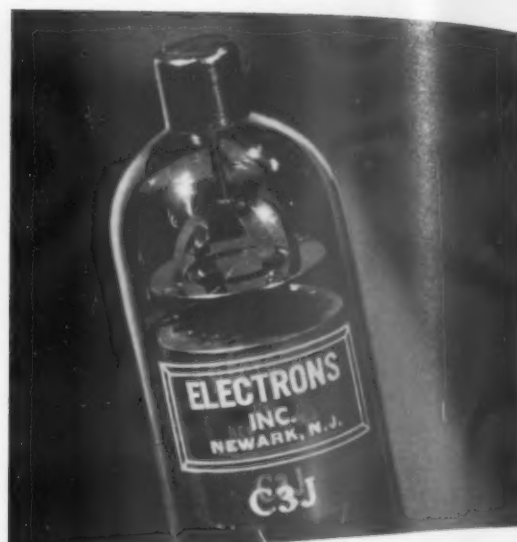
Check parts going out for sub contract work and final shipping weights.

No tie-up of men and equipment common to central weighing station layout. Weighs instantly as you lift the load to move it! Models 500 to 100,000 lbs. Dials 12", 24" and 30". Kilogram dials and other special designs for special work . . . Write for catalog.

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DETROIT 19, MICHIGAN

USE READER SERVICE CARD; INDICATE A-3-348-1



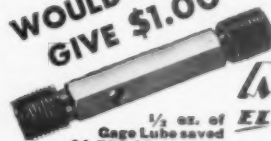
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tube specialists since 1928.
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TO SAVE GAGES WORTH
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1/4 oz. of
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makes costly precision tools and gages
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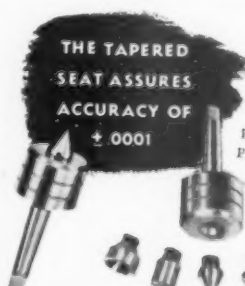
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THE TAPERED
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ACCURACY OF
± .0001

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LIVE CENTERS
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Manufactured in
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Special shanks
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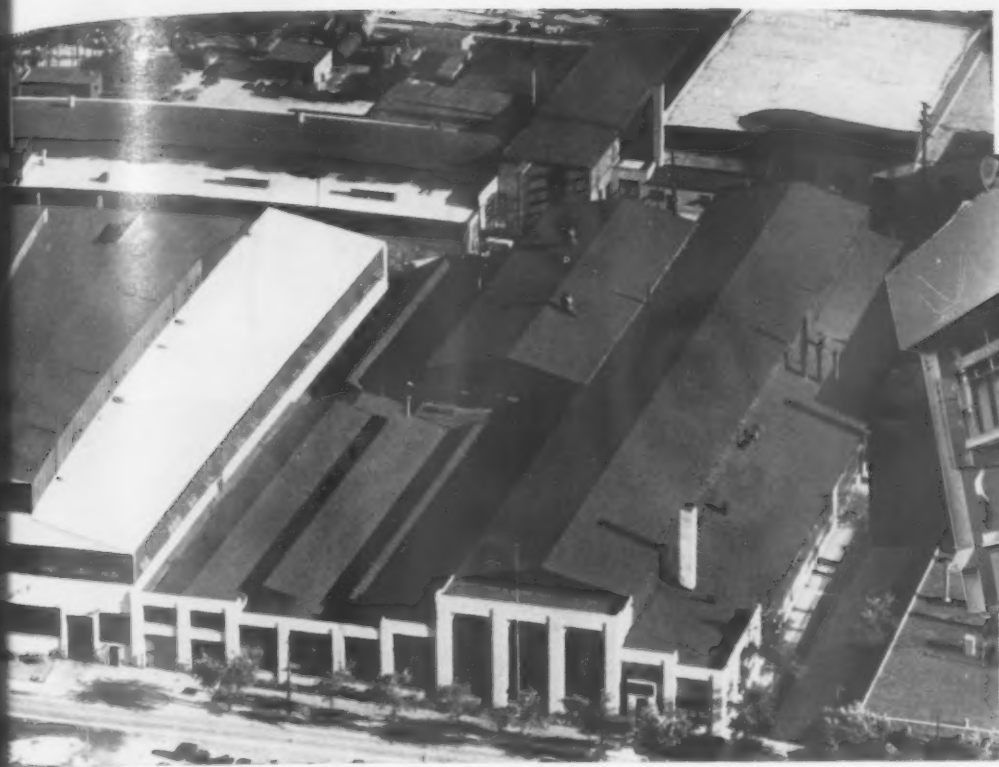
90 UNION ST.

MINEOLA, N. Y.

Points
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are
standard.

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The Tool Engineer



this plant produces **MASS PRODUCTION**

Development of the "punch press" of yesterday into a mass production machine to turn out parts of considerable size and weight, and often of great intricacy—that has been the contribution of Clearing Machine Corporation to the manufacturing industry of the world. The plant pictured here is at once the source and the result of that contribution.

A great many parts which as recently as 15 years ago were shaped and assembled by slower, more costly methods are today coming off presses at rates measured in hundreds per hour. Most of those presses are Clearings, because Clearing has specialized in developing equipment to do what had not been done before.

If you want to see how mass production itself is produced, how the visions of production men and tool engineers are given finite dimensions and hard reality in steel and bronze, you can find no better example anywhere.

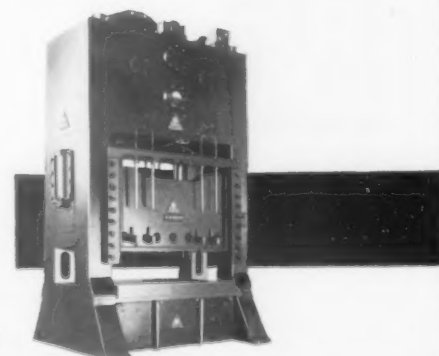
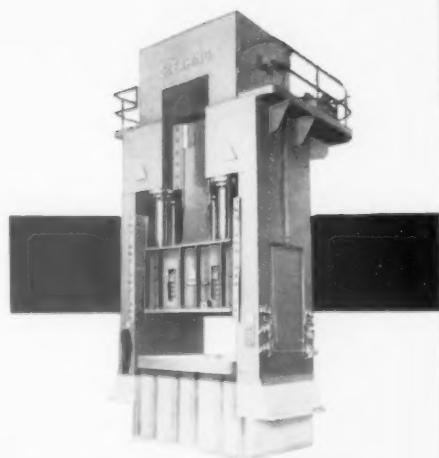
CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS
HAMILTON DIVISION, HAMILTON, OHIO



CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION



THREE CUTS IN ONE



MANHATTAN CUT-OFF WHEELS



CUT down COSTS, because the number of cuts per wheel have been increased through the development of tougher rubber and resinous bonds. Replacement wheels are not required as frequently.

CUT non-productive HOURS, since there is less down-time for wheel changes. Manhattan Cut-Off Wheels designed for specific work and specific materials give better cuts.

CUT out PROBLEMS. Manhattan supplies you with the right cut-off wheel for ferrous or non-ferrous castings, steel bars, pipe, structural shapes, stone or reinforced concrete, light gauge tubing, hardened or soft steel, heat-sensitive alloys, ceramics, or glass.

WRITE TO THE ABRASIVE WHEEL DEPARTMENT



MANHATTAN RUBBER DIVISION
RAYBESTOS-MANHATTAN, INC. PASSAIC, N. J.



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V-Belts



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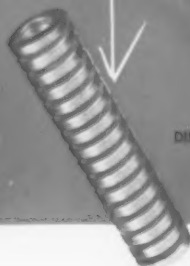
DOWEL PINS



CAP SCREWS



STRIPPER BOLTS



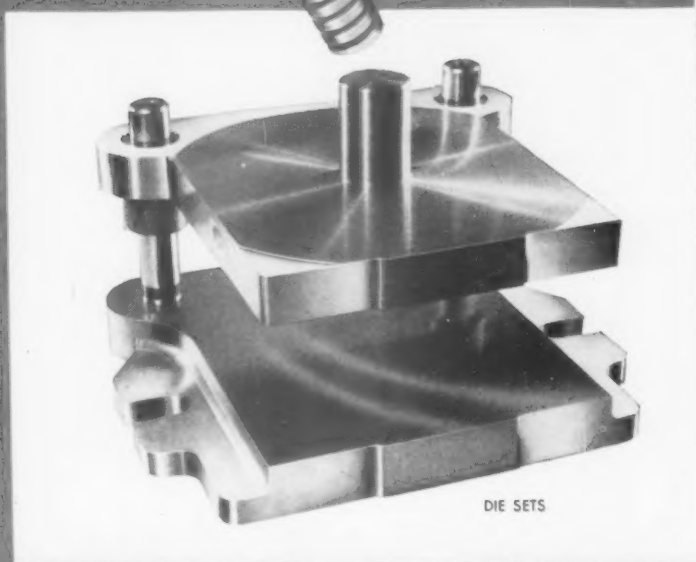
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When you start your tooling program by specifying DANLY Die Sets and Diemakers' Supplies, you are sure of . . .

1. *Reliable Danly precision*—a standard of quality for more than 28 years.
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That's why Danly is the first choice of diemakers everywhere!



DIE SETS

Send for this free Booklet today!

See how Danly's complete line will help you save tooling time.



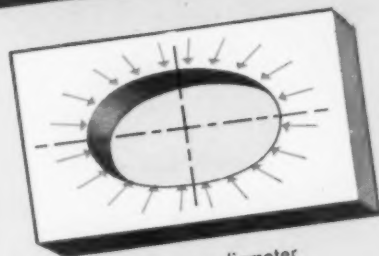
DANLY MACHINE SPECIALTIES, INC.

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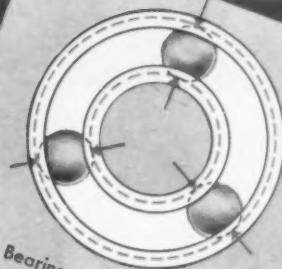


WE'LL BE LOOKING FOR YOU
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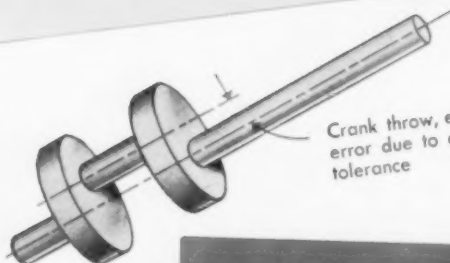
CHICAGO, MARCH 17-19—BOOTH No. 1610
(just inside the door)



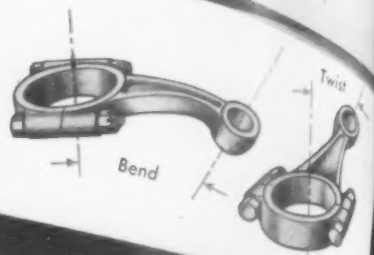
Average diameter of a hole



Bearing race matching



Crank throw, eliminating all error due to diametral tolerance



Lobing or cloverleaf of a centerless ground shaft



Typical Dimensions and Relationships measured with *Sheffield* PRECISIONAIRE GAGES

The range of dimensions and position relationships which can be measured quickly and precisely by Precisionaire Gages is almost limitless. In fact, some such measurements are possible otherwise only by elaborate auxiliary equipment in a well equipped laboratory to obtain the same degree of accuracy. Illustrated here are typical Precisionaire applications in which deviations have been exaggerated for greater clarity.

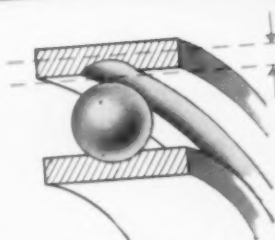
Precisionaires are the only gages which offer the combined advantages of greater linear scale length, amplifications of less than 1,000 up to more than 100,000 to 1, and instantaneous accurate reading regardless of the distance between the gaging element and the base instrument.

"If it can be gaged by air, it can be gaged best by Precisionaire."

Write for Precisionaire Application Book—
or call your Sheffield Representative.

the *Sheffield* corporation

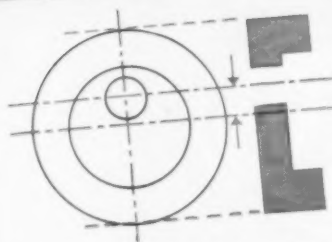
Dayton 1, Ohio, U.S.A.



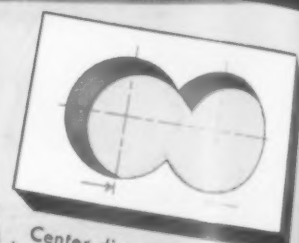
Internal radial clearance



Flatness



Distance between hole centers eliminating all error caused by diametral tolerance



Center distance of incomplete holes eliminating all error caused by diametral tolerance

Announcing a **NEW**

Bellows

"Controlled-Air-Power"
DEVICE



HYDRAIR

AIR POWERED DRILLING UNIT

1/4" drill capacity. 4" stroke. Standard rated spindle free speed 2800 RPM, rated 1/4 h.p., maximum developed horsepower 1/3 h.p. at 1500 RPM. Combines fast, safe, flexible air-power, full electrical control and hydraulic feed. Spindle traverse by the Bellows Air Motor with the built-in Electroaire Valve. Spindle rotation by a specially built rotary air motor. Feed rate controlled by the Bellows Hydro-check.

Use it singly for finger touch operation or foot-switch control, or synchronized to automatic work holding devices. Use it in multiple drill set ups with sequence timed operations with a single chucking. The HYDRAIR can be mounted at any angle. Its compact, space-saving design simplifies installation. Its low voltage electrical controls simplify wiring, assure complete electrical safety for operator and machine.

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1372

- Rapid Advance
- Controlled Feed
- Rapid Return

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HYDRAIR
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BOOTH 1424, MARCH 17-21
or write today for
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Address Dept. TE 352

The Bellows Co.
AKRON 9, OHIO

"Controlled-Air-Power for Faster, Safer and Better Production"



NEW ENGLAND DIVISION MILFORD, CONN.



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NOW **4** MODERN PLANTS

on industry's doorstep to expedite
service of your needs for

QUALITY

tubular and split rivets, rivet-setting
machines and special cold-headed
fasteners




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for faster, firmer, finer fasteners

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Precision Shaved

Gears

to Drive the.....

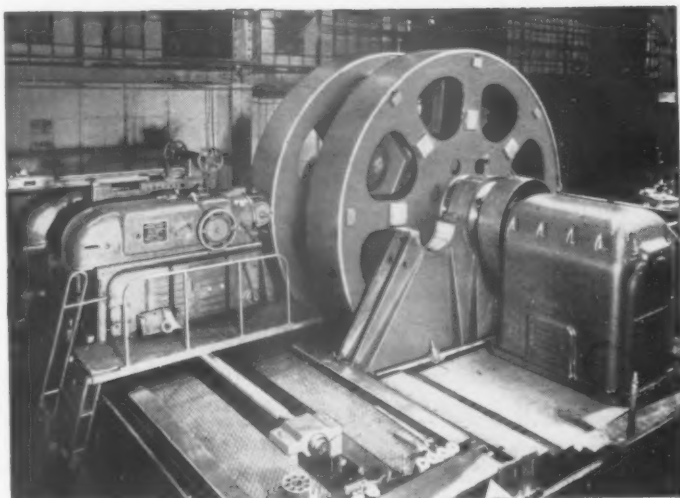
SS
UNITED
STATES



The largest, fastest, most luxurious ocean liner ever built in this country is an outstanding example of American know-how and initiative. Built by the Newport News Shipbuilding and Dry Dock Co., she carries the products of every state in the Union, including the finest mechanical equipment American industry can produce.

Among the important mechanical elements of the ship's propulsion machinery are the mammoth reduction gears made by Westinghouse Electric Corporation. To achieve the perfection of tooth surface required in these gears, they were finished on Red Ring Gear Shaving Machines.

These machines are built to shave gears of any size—from the smallest instrument gear to the largest marine gear.



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GEAR SPECIALISTS
IMITATORS OF ROTARY SHAVING
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**For Extreme
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You Can Depend on

JOHANSSON GAGING EQUIPMENT



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Finest Degree, — to Meet Your
Most Exacting Requirements —
Backed by the Name Supreme
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(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant

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A DIVISION OF SWEDISH GAGE CO.



1. Style MM on drill press. 2. Style DM on B & S automatic. 3. Style TM cutting taper threads on double-end threader. 4. Style MM on multi-spindle automatic. 5. Style DMS on turret lathe. 6. Style MM on threading machine.

***The majority of producers
of threaded parts prefer
H&G insert chaser die heads***

For the last word
in thread-cutting . . .

STOP AT

Booth 450

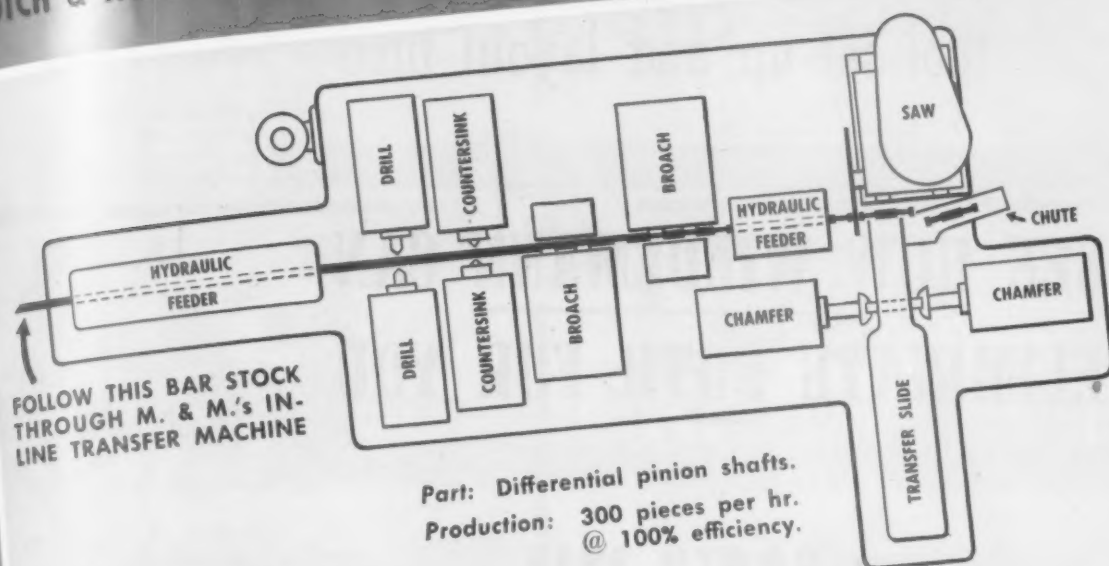
A.S.T.E. TOOL SHOW
CHICAGO

BECAUSE: 1 H&G cut high quality threads, straight, smooth and accurate to Class 3 fits. 2 Positive trip opens chasers at exact length of thread, an advantage for threading close to a shoulder. 3 Chasers are easily changed by any operator in two or three minutes. 4 The same set of chasers can be used in several styles and sizes of die heads. This interchangeability plus the low price per set reduces chaser inventory and investment. 5 The initial low cost of chasers and their extraordinary life insure new low threading costs.

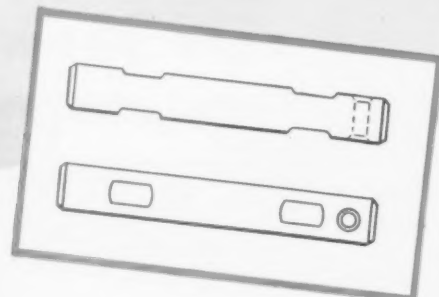
Check and mail for free bulletins: ☐ How to select proper die head for the job.
☐ Style MM ☐ Style DM ☐ Style TM ☐ Style DMS

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• Many machining operations are combined on an M. & M. progressive IN-LINE automatic transfer machine. Stock is held *motionless*. Most of the operations are performed on a length of solid bar stock prior to cutting off. Using the progressive in-line principle, we can design a production machine for your individual requirements. Odd-shaped extrusions present no machining problem.

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Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT



in sheet metal parts production
your greatest costs are
tool set up and layout time

**SEE HOW WIEDEMANN CAN
ELIMINATE BOTH FOR YOU**

BOOTH 1915

ASTE SHOW—MARCH 17-21

(TOOL ENGINEERS EXPOSITION)

INTERNATIONAL AMPHITHEATRE, CHICAGO, ILL.

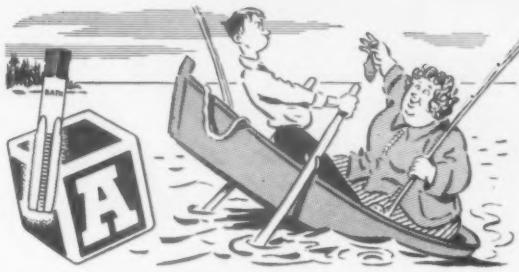
The WIEDEMANN Turret Punch
Press Method will be demonstrated
on the R-2, R41P, and RA41P
Turret Punch Presses

**WIEDEMANN
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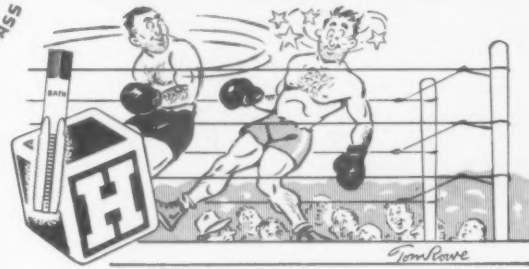
B is for **BODY**.
To pass keen inspection
A tap — or a gal
Must be shaped to perfection.



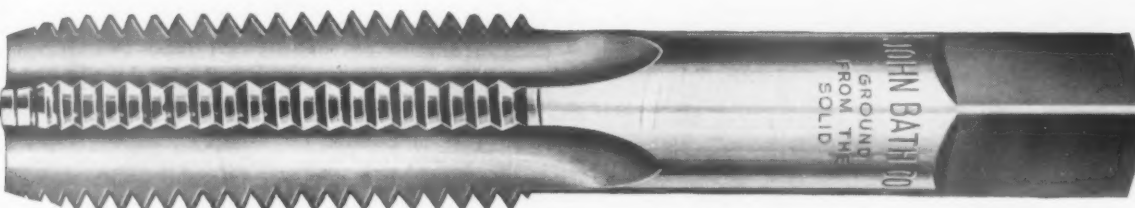
A is for **ANGLE**.
When not in condition
It's a mighty tough job —
Tappin' — or fishin'.



T is for **TEMPER**.
When you apply it with care
To a tap — or at home —
In the "pay-off" you'll share.



H is for **HOOK**.
In a tap cutting face
It makes plenty of difference
At the right time and place.



INSIST ON BATH TAPS . . . PROFIT BY THEIR PLUS-PERFORMANCE

Put them all together . . . they spell B-A-T-H . . . a brand name for dependable taps of controlled uniformity. Bath craftsmanship and engineering experience guarantee taps "ground from the solid" that have an accurate **BODY**, cut to the right **ANGLE**, made of steel of the proper **TEMPER**, with the right **HOOK** on the cutting face.

In the making of fine cutting tools like Bath Taps . . . there is more manufacturing skill required than meets the eye. Close check through every step during production insures Bath Taps of uniform structure and measure — to give you longer wear, higher speed and increased production. Bath Taps will solve your threading problems from A to Z.

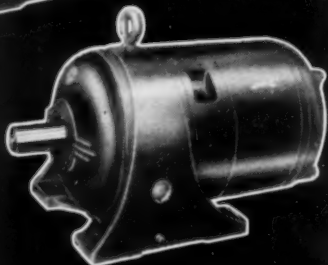
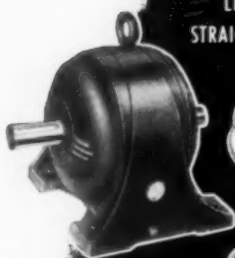
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JOHN BATH CO. INCORPORATED
28 Grafton St., Worcester, Mass.

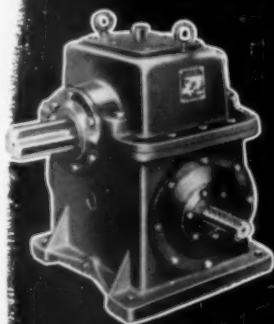
HAVE YOU A DRIVE PROBLEM?

CALL FOOTE BROS.

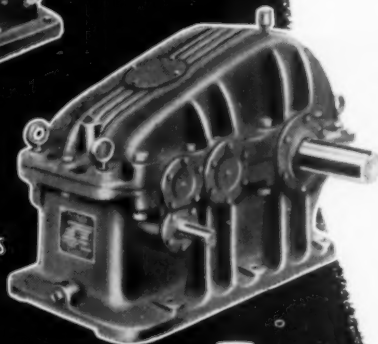
LINE-O-POWER
STRAIGHT LINE DRIVES



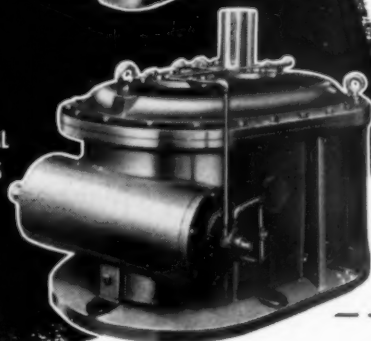
FOOTE BROS.—LOUIS ALLIS
GEARMOTORS



HYGRADE HORIZONTAL
WORM GEAR DRIVES



MAXI-POWER
HELICAL GEAR DRIVES



VERTICAL
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GEAR DRIVES

Compact, small size units for use on original equipment—both horizontal or vertical worm gear drives—heavy duty helical gear drives up to approximately 1000 h. p.—gearmotors. Whatever your requirements in power transmission, you will find exactly what you need in the complete Foote Bros. line.

Three large plants, containing the latest in gear cutting equipment, are backed by nearly a century of engineering and manufacturing experience. New techniques, better control of material, improved manufacturing methods—all assure superior enclosed gear drives. Check the coupon for the bulletin in which you are interested.

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. T, 4545 S. Western Ave. Chicago 9, Illinois

LINE-O-POWER STRAIGHT-LINE DRIVES

Economical in original cost and operation. Duti-Rated Gears have file-hard tooth surfaces and ductile cores, assuring long life. Double or triple reductions, with ratios from 5 to 1 up to 25 to 1 and capacity range from 1 up to 200 horsepower.

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A compact line of gearmotors in 17 sizes in single, double and triple reductions, incorporating Duti-Rated Gears that assure long wear life and maximum load-carrying capacity. Available with Louis Allis open drip-proof, splash-proof, enclosed and explosion-proof motors.

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Heavy-duty helical gear drives. Available in single reduction units, ratios up to 9.91 to 1; capacities up to 1,550 horsepower; double-reduction units, ratios from 9.32 up to 71 to 1, capacities to 1100 horsepower; triple reduction units, ratios from 79 to 1 to 360 to 1, capacities up to 420 horsepower.

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Heavy duty vertical drives with horizontal input shafts and vertical output shafts—up or down. Ratios from approximately 25 to 285 to 1 and a capacity range up to 128 horsepower.

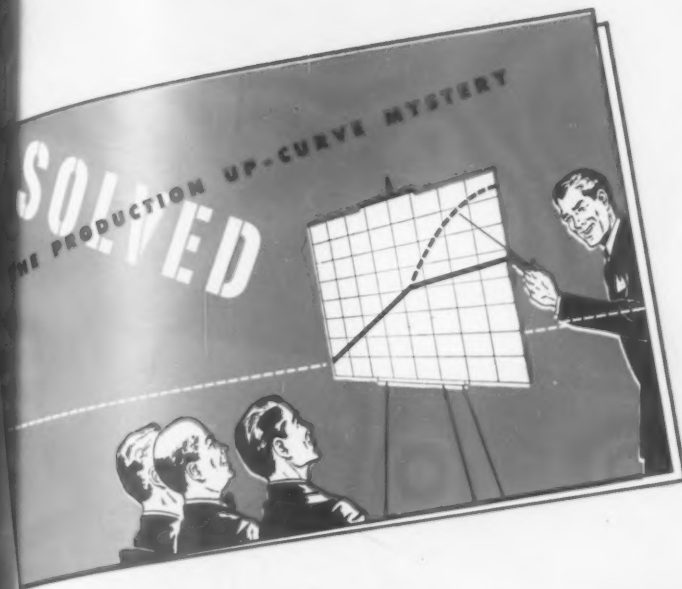
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Better Power Transmission Through Better Gears

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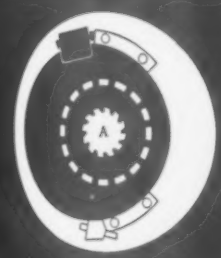
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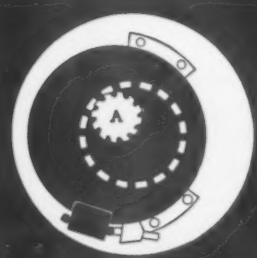
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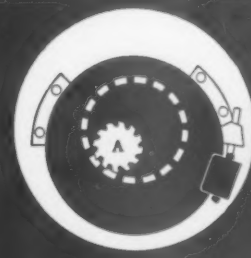
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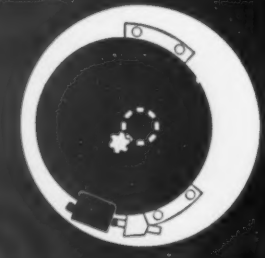
The work (dotted white circle) does not revolve. Cutter is revolved around work.



For internal form and thread-milling, cutter (A) moves out from center to contact work.



Cutter moves in circle, completing cut; rapid reverse returns cutter to center.



For external milling, cutter moves in to contact work then moves around work

PLAN-©-MILL



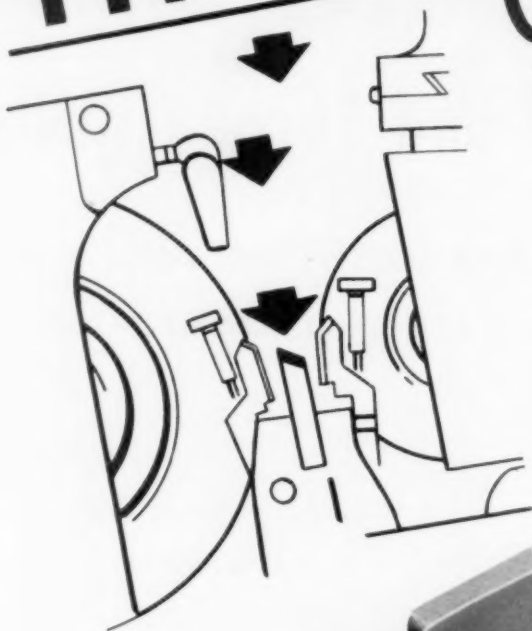
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Please rush my copy of: "SOLVED: The Production Up-Curve Mystery."

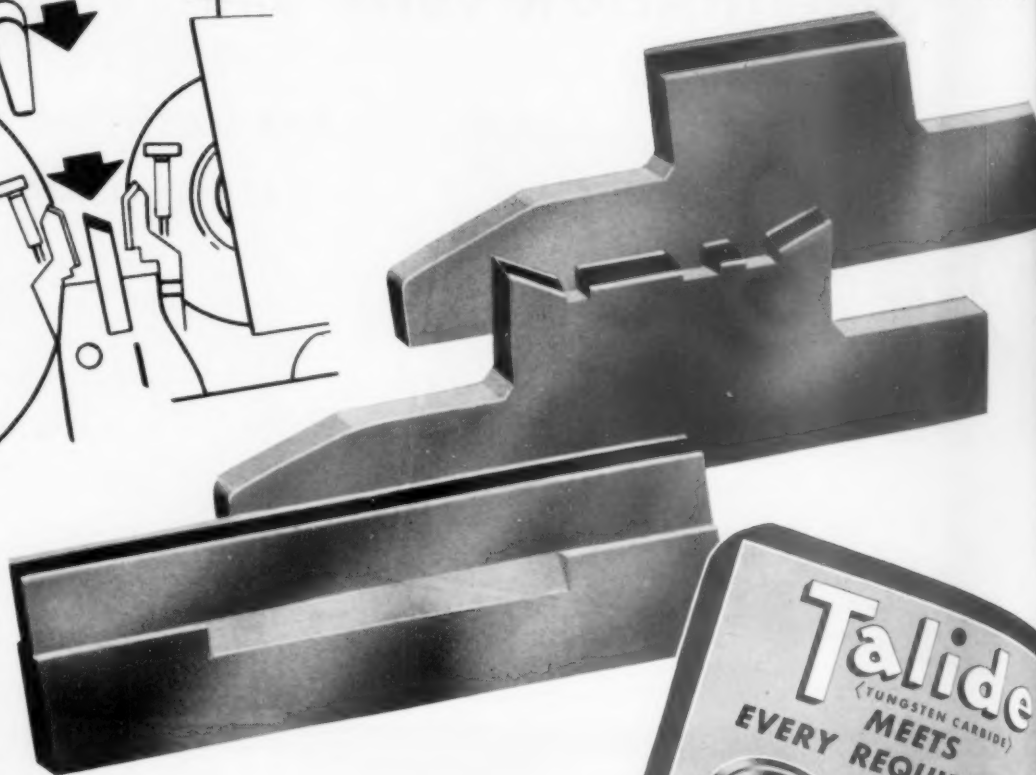
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You can obtain standard Talide Centerless Blades immediately from our warehouses in Newark, Youngstown, Detroit or Chicago.



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OVER
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METALLURGY

GET DUMORE

the drill head with automatic built-in controls

... and get all these cost reducing benefits



Motor manufacturer doubled output on armature shaft drilling. Decreased drill breakage 25 times.

Unusual setup drills bronze nozzle holders. Labor costs slashed \$75 on first run of 5273 pieces.

Sound equipment manufacturer cashed in on big savings. Cut drill breakage to the bone.

WITH the Dumore automatic drill head, you can say goodbye to excessive drill breakage, down time and scrap loss on small diameter, deep hole drilling. And just as important, you *increase* drilling capacity.

Get all the information about this

revolutionary tool. Ask for demonstration. See how it eliminates operator guesswork and provides completely automatic control, flexibility of setup, big cost reductions at desirably low cost.

Call your distributor today, or write for bulletin.

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No cumbersome air lines to hook up. Simply plug into electrical outlet. Built-in rotary air compressor advances drill at *required* speed and feed for *new resistance drilling*.

New Resistance Drilling

Provides completely automatic operation. Self-compensating control of drill by combined action of Air Feed Pressure Regulator and built-in return spring allows material being drilled to govern rate of drill feed and speed.

Adjustable Stroke Control

Select depth of stroke by adjustable stop nuts. Allows *measured depth* drilling from 1/32" to 1-1/8". Can be controlled to .004" preciseness.

Air Feed Pressure Regulator

Permits adjustment of pressure up to 15 P.S.I. Allows for variation in drill size. This simple control governs rate of drill advancement in work. Once set, stroke advance is constant.

Automatic Chip Clearance

Depth Staging feature provides retraction of drill at proper intervals for chip clearance. Prevents drill breakthrough, practically eliminates costly drill breakage.

Maximum Drilling Production

Automatic operation of drill allows free use of operator's hands. Fast, one-time setup makes this machine ideal for simultaneous operations.

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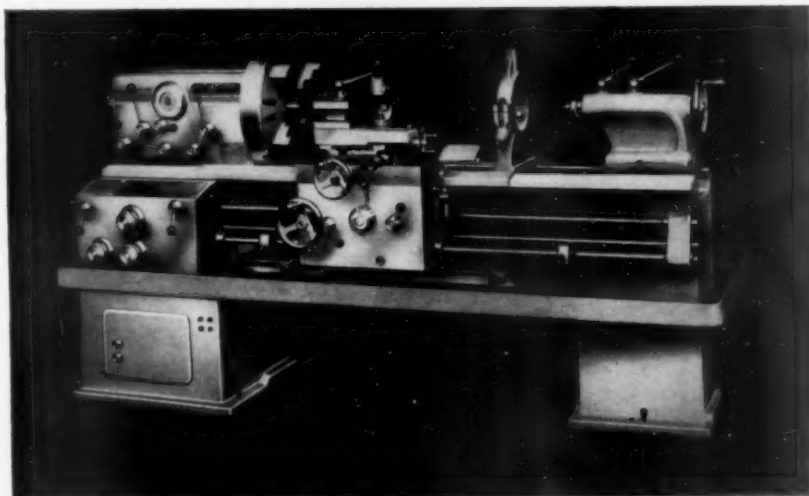
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March, 1952

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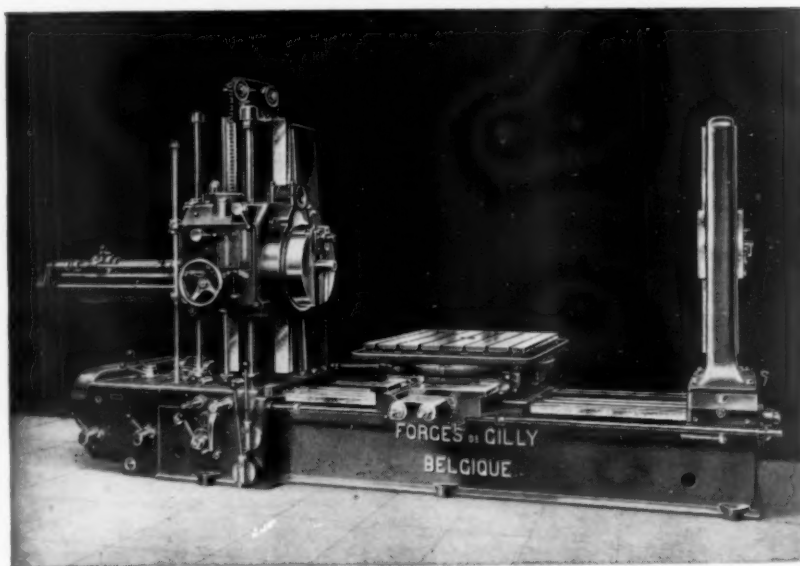
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DEMOOR "MAGIC EYE" MODEL 821 (19 $\frac{1}{4}$ " SWING)

GILLY MODEL AFMF80 (3 3/64" SPINDLE HORIZONTAL BORING MACHINE)



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Demoor Lathes are rugged and fast with many exclusive features:

They are built in a wide variety of swings and center distances—

54 sizes from 19 $\frac{1}{4}$ " to 41 $\frac{1}{4}$ "

swing, 40" centers to 238" centers.

Very complete standard equipment, with a full range of extras.

Many are now in use in U. S. plants;

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Gilly horizontal boring and milling machines are made in table and floor models from 2 3/16" to 8" spindle sizes. Their efficiency has been demonstrated in the many U. S. plants now using them. Many capacity variants available for fast delivery.

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FREE Cylinder Catalog and Templates offered by Ortman-Miller Co.

Book outlines several special features of O-M cylinders.

FREE

A new, 28 page catalog has just been released by the Ortman-Miller Machine Co. which gives complete engineering specifications, data on O-M's special internal locking system and special full listing of O-M parts. Prepared for designers and users of cylinders for any application, it covers standard, oversize and 2-1 piston rods, giving full information on all sizes from 1½" to 8" bores.

SPECIAL FEATURES

Included are detailed explanations of the many features which have made ORTMAN-MILLER cylinders standard in thousands of plants throughout the country. Detailed drawings and copy explain the special shear bar assembly which completely eliminates bulky end caps and tie rods, thus saving up to 1/3 in space. In addition, it shows the vast number of interchangeable mountings and applications which almost always eliminate the need for special castings or patterns. This feature alone not only saves initial costs, but cuts down on inventory and greatly speeds up delivery on every order.

Special Note:

30 DAY DELIVERY

Increased production facilities and standardization of parts continue to make possible delivery in 30 days or less on almost all orders for O-M cylinders. Write today for details.

FREE TEMPLATES

In addition to the FREE catalog, Ortman-Miller also leads the field in making available FREE TEMPLATES of all O-M cylinders. Prepared in half scale, they are extremely useful in design and application of O-M cylinders to your special requirements.

For your FREE Catalog or templates, use the coupon in the ad at the right. Or write to ORTMAN-MILLER Machine Co., 150th St., Hammond, Indiana.

4 REASONS WHY



YOU

SHOULD USE

O-M

AIR, WATER & HYDRAULIC CYLINDERS

1 30 DAY DELIVERY

Complete standardization of interchangeable parts and elimination of need for special patterns and castings mean faster production, lower costs. Even the most difficult "custom" applications can almost always be made from O-M standard cylinders . . . without delay!

2 NO TIE-RODS, BOLTS or SCREWS!

New simplified design completely eliminates bulky end caps and tie rods, saves up to 1/3 in space. No bolts or screws. Special circumferential keys allow quick, easy installation, even faster repacking.

3 MACHINED STEEL, NO CASTINGS

All cylinder body parts are bar stock steel, made in automatic screw machines. No castings whatsoever. All bearing surfaces are bronze.

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O-M special features mean less inventory . . . increased uses from standard sizes. Interchangeable mounting brackets, ports adjustable to any angle. Full range of sizes from 1½" to 8" bores.

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IN COLUMN
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Gives full details, data and specifications on all O-M cylinders. Standard, oversize & 2-1 piston rods.

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Complete set of 1/2 scale templates showing all cylinders and mounting brackets.



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Model A-10P
Comparator and
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MERZ gages

give you
**GREATER
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(Above)
Equipped with meter
directly over the in-
dicator pick up head.
This has the advan-
tage of positioning
the graduated scale
directly above the
work.

Every MERZ Electronic Gage is a ruggedly constructed precision instrument designed for use where extreme accuracy, speed and versatility are required. Each gage is equipped with two (2) stages of amplification, each graduation being .00001" on the "A" scale or .0001" on the "B" scale with a maximum range of .006". However, on application any amplification or range can be had with three or more scales. MERZ Gages are widely acclaimed and accepted by industry and the Bureau of Standards in Washington.

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Model C-10 Pick Up Head
Used in conjunction
with Model B-10
Power Unit.

Model E-10 Pick Up Head
Used in conjunction
with Model B-10
Power Unit.

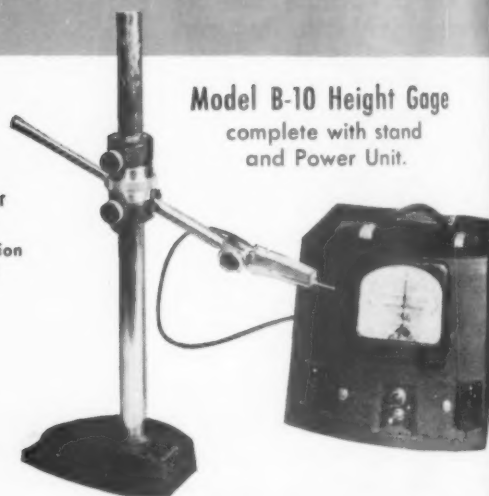
B

A Equipped with the meter separate from the pick up head and mounted on the Power Unit. Meter can be positioned to best readability range.

B Designed for use where a minimum size of the pick up is desirable, making it applicable to snap gages, special fixtures and sorting machines.



Model B-10 Indicator
PICK UP HEAD
Used in conjunction
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Model B-10 Height Gage
complete with stand
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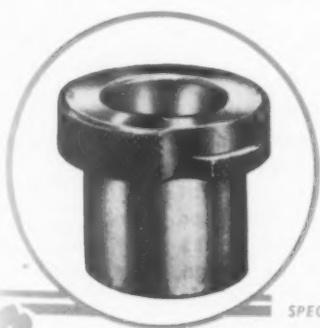
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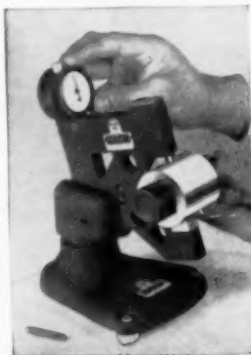


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POSITIVE VISIBLE CONTROL *The NILCO WAY*



COMPARATOR DIAL SNAP GAGE

Enables inspector to use both hands for checking. Note that the weight of part rests on solid anvil.



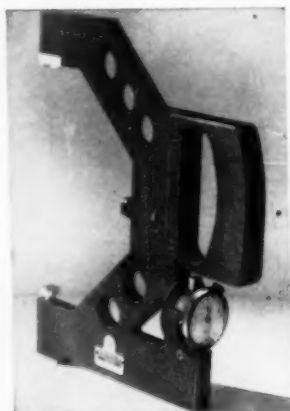
THE FASTEST, MOST ACCURATE MODERN METHOD TO CHECK INTERNAL GROOVE DIAMETERS

DIAL SNAP GAGE AND MASTER WITH STAND



Correct readings are obtained at once. There is no need of rocking back and forth, so often required in ordinary dial snap gages. This speeds operation of turning or grinding when it is important to know how much is left on the diameter; .0001 indicator quickly reflects the size on the gage, giving control, confidence, and speed to the operator.

The Nilco Dial Groove Gage is a self-positioning precision instrument especially designed to provide POSITIVE CONTROL in checking diameters of internal grooves and recesses, Truarc and "O" rings, oil grooves, washer grooves, etc. Because of its unique design and patented features the Nilco Dial Groove Gage can be used efficiently by both skilled and unskilled personnel in maintaining quality control and inspection throughout production. Setting can be made direct to master ring gage, a gage block combination, or micrometer. Illustrations and literature are available on this gage and also on the companion dial groove location gage for checking internal groove locations.



LARGE SIZE SNAP GAGE

Even for large diameters, gage is light, compact, easy to handle. Will repeat. Nilco dial snap gages make possible close shoulder checking, radius guides applicable on request.



SMALL DIAL BORE GAGES

This fastest setting dial bore gage provides the operator control on small bores in graduations of .0001". Three models cover the range from $\frac{3}{8}$ " to 1".

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ENGINEERS



IN GAGES



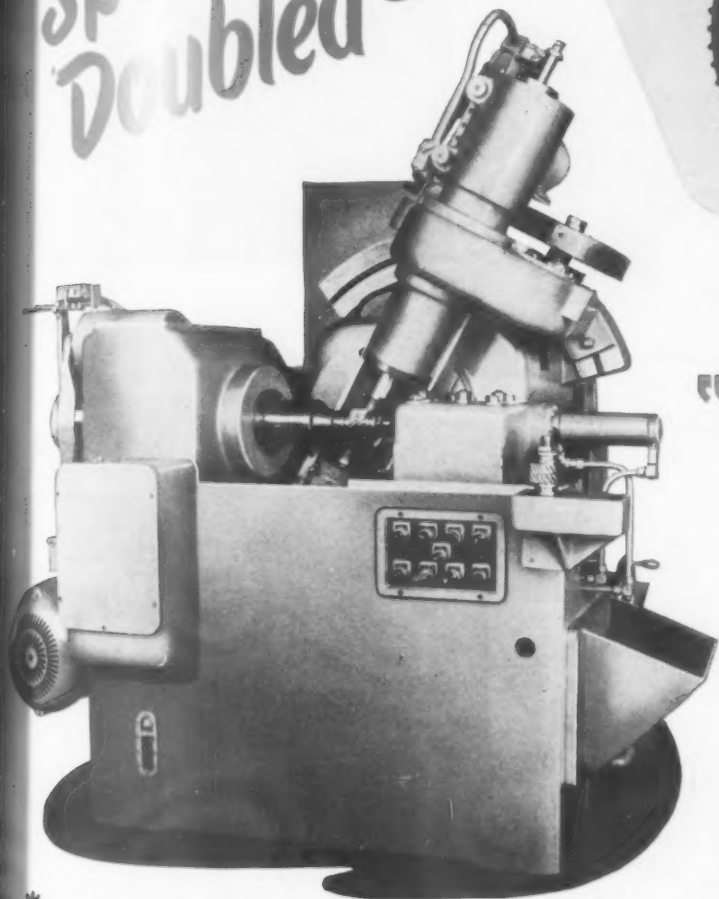
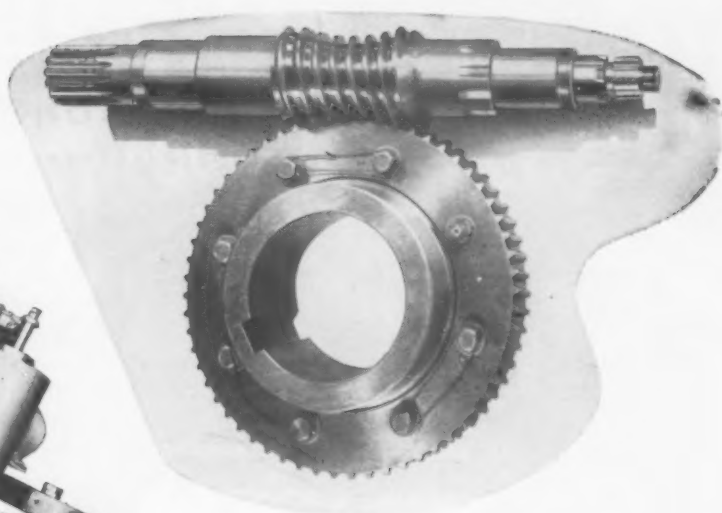
LARGE DIAL BORE GAGES

Checking internal diameter quickly, easily; simple setting to gage blocks or master ring. No skill needed for setting or checking. Compactness and simplicity of design make possible five models in standard or pistol grip design from 1" to 12".

Also, all types of dial snap gages, dial bore gage, internal and external dial spline gages for checking pitch diameter of gears and splines. New NILCO DIAL GROOVE LOCATION GAGE, AGD plain plug and ring gages.

NILSSON GAGE CO., INC. POUGHKEEPSIE, N. Y.

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Doubled*



with
"hydraulically"
smooth
CONE-DRIVE
gears

ON the gear hobber illustrated here, high speed steel hobs are now run at CARBIDE SPEEDS—without sacrifice in hob life.

*and tripled

In addition to taking out vibrations, Cone-Drive Gears in this machine also made possible a large reduction in number of gears required in the drive.

Impossible? Not when 'hydraulically' smooth DOUBLE-enveloping Cone-Drive gears are used. The main drive and index drive in this machine use Cone-Drive gears and are so smooth that the usual high-frequency vibrations caused by gearing are eliminated, to all practical purposes.

This vibration-free drive made it possible to run high speed steel hobs efficiently at several hundred feet per minute cutting speed instead of the usual 80 or 90.

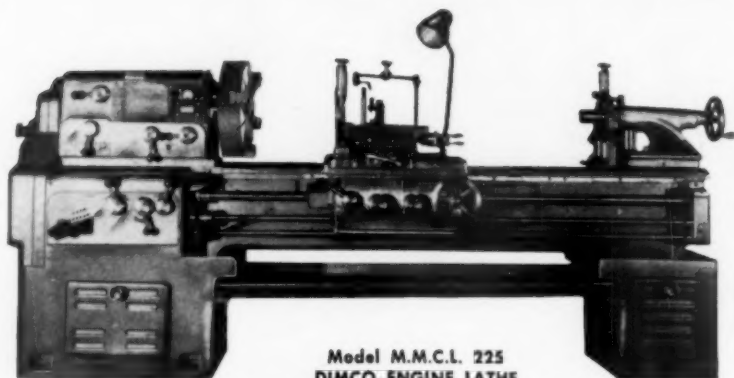
That same 'hydraulic' smoothness can do wonders for your machines, too. You can obtain it either through designing standard double-enveloping Cone-Drive gears into your machines or by using complete Cone-Drive reducers instead of built-in gearing.

We will be glad to study your designs for the simplest way to apply the advantages of DOUBLE-enveloping Cone-Drive gears to your equipment.

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KELVIN

**SPEEDS UP
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WITH.....**



**Model M.M.C.I. 225
DIMCO ENGINE LATHE**

Geared head. 17 1/2" swing over bed. Spindle speeds (12): 32-1000. Speed change gears slide on splined shafts. Hardened and ground gears.

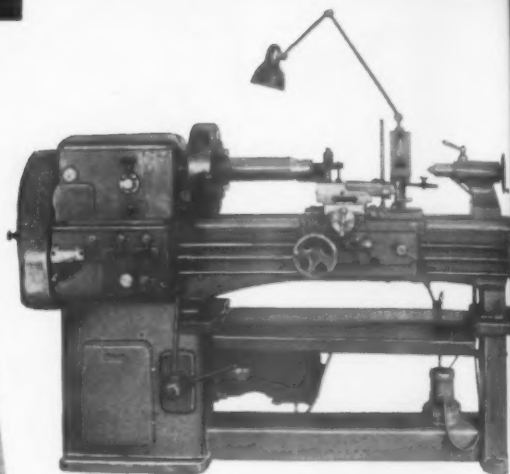


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RADIAL DRILLS**

These powerful DIMCO machine tools are precision-built for continuous production. They're giving top service now in many plants throughout America.

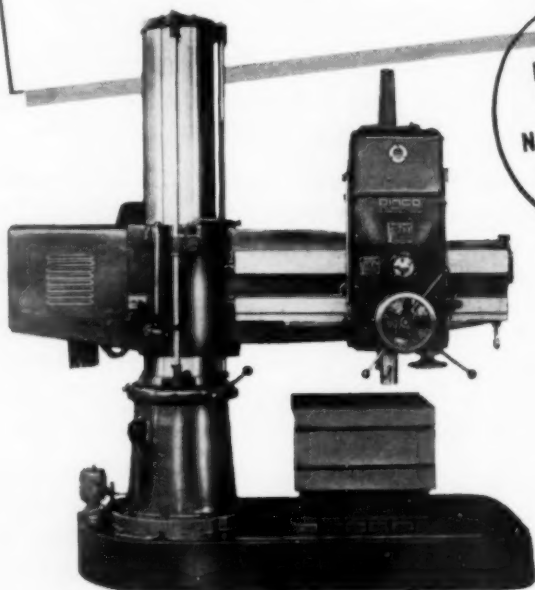
Write us for our new catalog giving detailed information and specifications on these rugged machines, as well as the complete DIMCO line.



**Model DBC 175
DIMCO ENGINE LATHE**

Geared head. 13" swing over bed. Speed (standard model): 26-1004. High speed model: 52-2008. Speed change gears slide on splined shafts. Hardened and ground gears.

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March, 1952

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Compare this with solid reamers which are made completely of expensive tool steel. WAUKESHA Reamer bodies are of less costly steel but the precision machined blades are made of the finest high speed tool steel obtainable. Carbide tipped blades available if the work demands.

And that's why WAUKESHA Inserted Blade Reamers are low in initial cost—and much lower over the years.

WAUKESHA Inserted Reamer Blades cut with high precision—a smooth and positive shear that saves horsepower and faithfully gives you exceptional blade life and low replacement cost.

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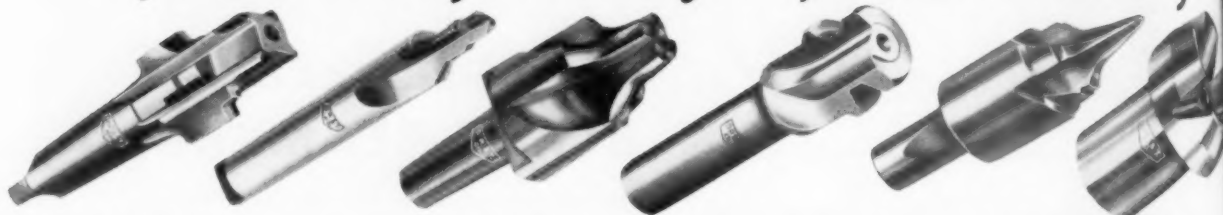
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DETROIT REAMER & TOOL CO.

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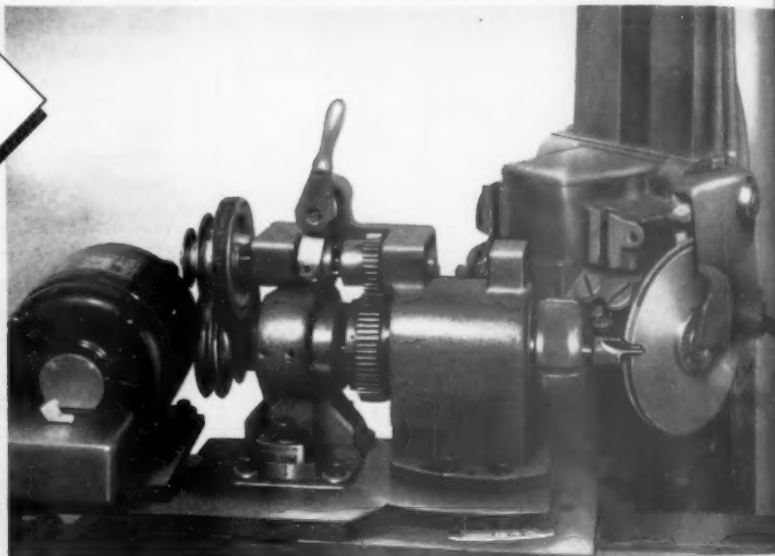
Special Cutting Tools of Dependable Quality



The Detroit Reamer & Tool Co. Plant is equipped with the finest in modern machinery and inspection facilities to provide you with the ultimate in precision tools. Our Engineering and production personnel with

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CIRCULARITY-GRINDING ATTACHMENT



The Detroit Reamer & Tool Co. has developed the Circularity-Grinding Attachment illustrated above to permit your own tool makers to quickly and easily answer your production requirements for new cutting tools. With this attachment new cutting tools can be quickly ground from raw stock, old tools converted

to meet new requirements or standard tools reground to your specifications. The Circularity Grinder is of inestimable value when emergencies exist, demand for a new tool is urgent or production lines must be kept running. With this attachment in your shop you eliminate delayed deliveries.

Illustrations are typical of the many "PRECISION CUTTING TOOLS OF DEPENDABLE QUALITY" Manufactured by DETROIT REAMER & TOOL CO., DETROIT 34, MICHIGAN

SEE THIS ★ ★ ★ ★ DOUBLE FEATURE

Feature 1

Production Brazing with EASY-FLO

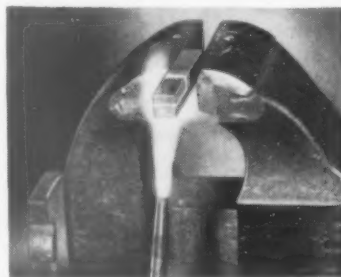


★ **SEE** this EASY-FLO production brazing set-up in action — turning out beautifully brazed steel assemblies in a steady stream at the flip of a switch — with the human element entirely eliminated from the heating and actual brazing. It's an eye-opening demonstration of how easy it is to get fast, low-cost metal joining with EASY-FLO. Don't miss it.

Feature 2

Tool Tipping with EASY-FLO No. 3

★ **SEE** this revealing demonstration of cemented carbide tool tips being torch-brazed to tool shanks the easy, fast, economical way — with EASY-FLO No. 3.



at the ASTE show-Booth 1818

★ **BRAZING ENGINEERS** with a wide background of experience will be in our booth 1818 at all times, ready and eager to discuss your brazing problems with you.

IF YOU CAN'T ATTEND Get the full EASY-FLO brazing story — learn about SIL-FOS too for joining non-ferrous metals — in these two bulletins.

BULLETIN 20 — This 24-page bulletin tells why strength, speed and economy are inherent in EASY-FLO and SIL-FOS brazing, and is packed with useful information about joint design and fast production methods.

BULLETIN 11-A — gives step-by-step directions for brazing carbide tips to tool shanks with EASY-FLO No. 3 . . . also, how to join high speed steel tips to tool holders with EASY-FLO. Write for copies — today.



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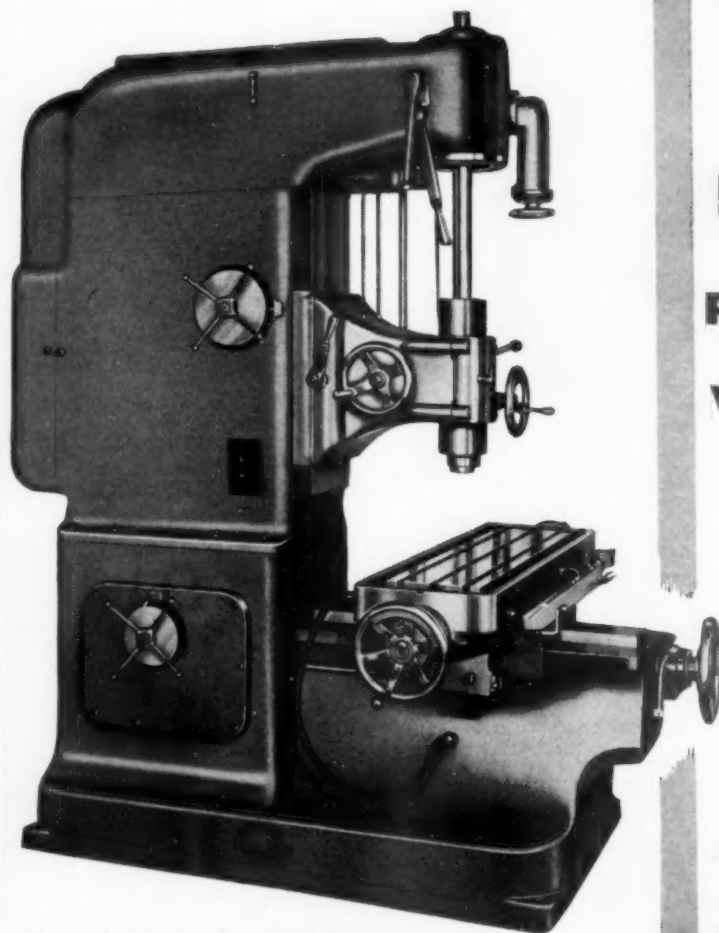
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375

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- Cuts setup time in half
- Eliminates work transfers
- Increases output, reduces cost



Sixteen Spindle speeds, 40 to 2000 r.p.m. —
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traverse per minute in both directions — 16 Table
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 PRACTICAL DEMONSTRATIONS LEADING TO
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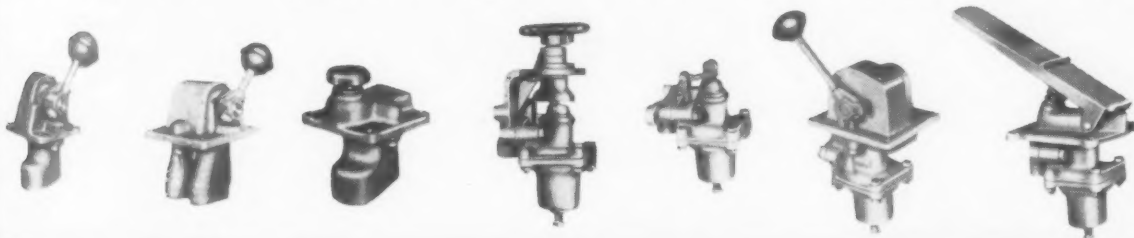
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As We See It, you know all about the need for correct localized lighting. And you know there's no control to compare with the Dazor Floating Arm for fitting the light to the individual user. Our job, then, is to help you select the *right* Dazor Lamp for each application. Here are three models on which engineers have placed a big O. K. for boosting production.

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Call Your Dazor Distributor for details and an early demonstration of any Dazor. If you wish the name of this helpful lighting authority, write Dazor Manufacturing Corp., 4481-87 Duncan Ave., St. Louis 10, Mo. *In Canada* address inquiries to Amalgamated Electric Corporation Limited, Toronto 6, Ontario.

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Chicago, March 17-21

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FLUORESCENT and INCANDESCENT



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Dazor Air-Cooled Incandescent
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Dazor Floating Magnifier
with Fluorescent Lighting
Universal Model



Dazor Fluorescent
Floating Lamp
Universal Model

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SPECIAL
MACHINERY
SINCE 1918**

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Way back in 1918, the first Greenlee Special Machine went into operation in the tractor plant of a now famous automobile manufacturer (who still makes tractors). We've made a lot of machines since then, from small, special purpose machines performing only a few operations to huge transfer machines employing several hundred tools working in automatic, unvarying cycles. We're still making special machines... and constantly developing new methods for faster, cheaper production processes.

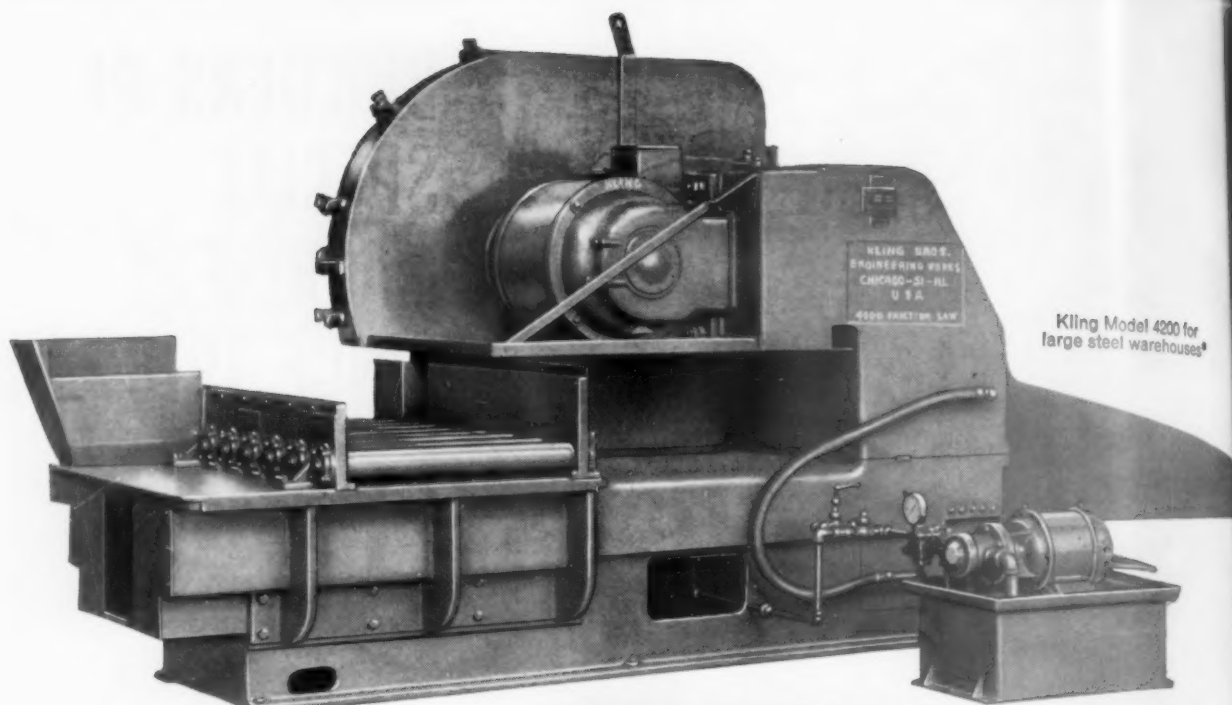
PRODUCTION MACHINERY

GREENLEE



GREENLEE BROS. & CO.,
1983 MASON AVE., ROCKFORD, ILL.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES



PROOF that you can

do it faster with KLING high speed friction saw

What is friction sawing?

It's a proven method of cutting metal by generating heat through friction on the part to be cut at a rate faster than that part can absorb heat. This temperature increase reduces the tensile strength of the piece to the point that the weakened surface can no longer resist the action of the colder blade. The metal is thus easily removed with no apparent wear on the blade surface.

Fastest, all-around cut-off machine in the shop!










Cuts all types of steel, hard or soft, big or small, in any shape, without distortion. For day-in, day-out production, one Kling Friction Saw will do the volume of work that would ordinarily require several separate shears or slow speed saws. One of the big time-saving reasons is the ability of the Kling Friction Saw to cut any structural shape, without change of blade or setup. Because the average Friction Saw blade will give a good full day's production before requiring redressing, you eliminate costly downtime and also save on tool costs.

FREE complete, friction sawing information!

Learn how you can profitably apply Kling Friction Sawing in your plant. The information contained in this 12-page bulletin will give you the complete story on Friction Sawing... including the principles of the process and some of its applications. Write today for your FREE copy.



KLING BROS. ENGINEERING WORKS
1321 N. Kostner Ave. • Chicago 51, Illinois

How long would it take you to cut these pieces?	With a Kling friction saw you could do it in approximately...
24" 100 lb. I Beam 	28 seconds
15" 55 lb. Channel 	15 seconds
8"x8"x34.3 lb. H Beam 	10 seconds
100 lb. A.R.A. Rail 	9 seconds
6-1/2"x6-1/2"x19.8 lb. Tee 	5 seconds
8"x8"x3/4" Angle 	11 seconds
3" Square 	10 seconds
4" Round 	15 seconds
6" O.D. Tube, 1/2" Wall 	11 seconds

*What's your requirement? There's a size to fit your specific needs—large or small.

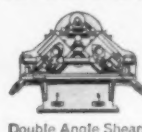
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Year

Kling

...an investment in speed!



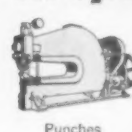
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Punches



Plate Bending Roll

CUSHMAN

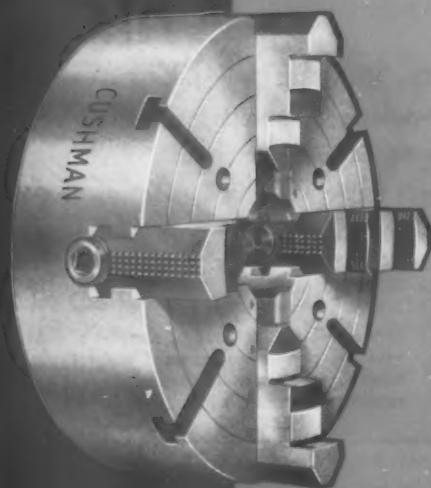
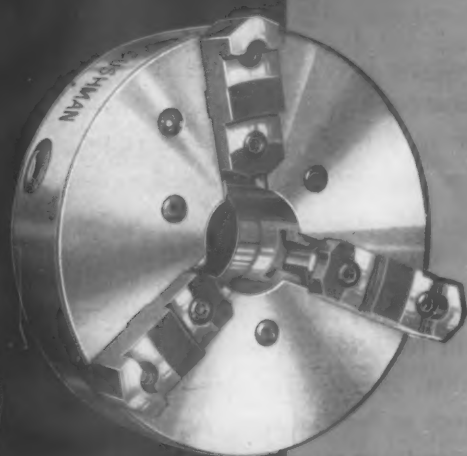
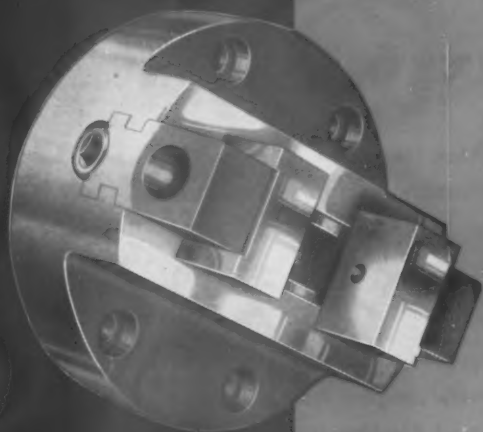
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Cushman Chucks are designed and built to meet in every respect the high precision standards of the Machine Tool Industry. Each individual chuck is carefully inspected, tested and indicated to be within specified tolerances before shipment. You can depend upon Cushman Chucks to perform well and to hold their high initial accuracy throughout a long service life.

Cushman Chucks are made in an extremely wide range of sizes . . . for light, medium, heavy and extra heavy duty . . . in 2, 3 and 4-jaw styles . . . independent, self-centering or combination types . . . also collet chucks and collets. Cushman also manufactures boring mill face plate jaws and the well-known Cushman Power Wrench. Where special work-holding problems are involved, our engineering department is well equipped and always ready to serve you.

The Cushman Chuck Catalog No. 64-1951 covers Wrench Operated Chucks in complete detail, with engineering drawings and dimension data necessary for design and installation. A copy will be sent to you on request.

Cushman also manufactures
Power Operated Chucks and
Electric Power Wrenches.



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HARTFORD 2, CONN.

... PUT ~~HIGH SPEED~~ INTO YOUR PRODUCTION LINE ...

These four High Speed machines have helped increase production and reduce assembly costs in many industries. Our free engineering service may show how you can use one or more of these High Speed machines in your tooling set up.

COLD RIVETER

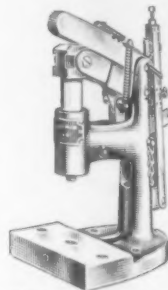
Fast, versatile—"Hickory Helve Flexibility." Made in 10 sizes to cold-head rivets ranging from 1/64" to 2" in diameter. In addition to riveting, High Speed Riveting Hammers can perform 16 other metal working operations.



COLD RIVETER

STAKING MACHINE

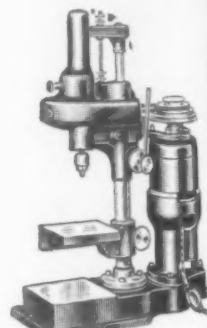
Available in four foot- and two air-operated models. Will handle over 1000 pieces per hour. Speeds staking, riveting, eyeletting, stamping, marking, grom-meting, burring, pointing with platinum, tungsten, or silver. Delivers uniform blow regardless of slight variations in thickness of parts being staked or riveted.



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Model R53 is an accurate sensitive precision drill of highest quality. Built for ANY precision drilling from No. 80 to 1/4 inch. Spindle travel 2 1/4 inches. Spindle speed range—750 to 6,000. Accurate adjustable depth gauges. Bench or Pedestal type. Also multiple spindle types—with 2 to 6 individually motor-driven spindles.



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WIRE STRIPPER

FREE ENGINEERING SERVICE

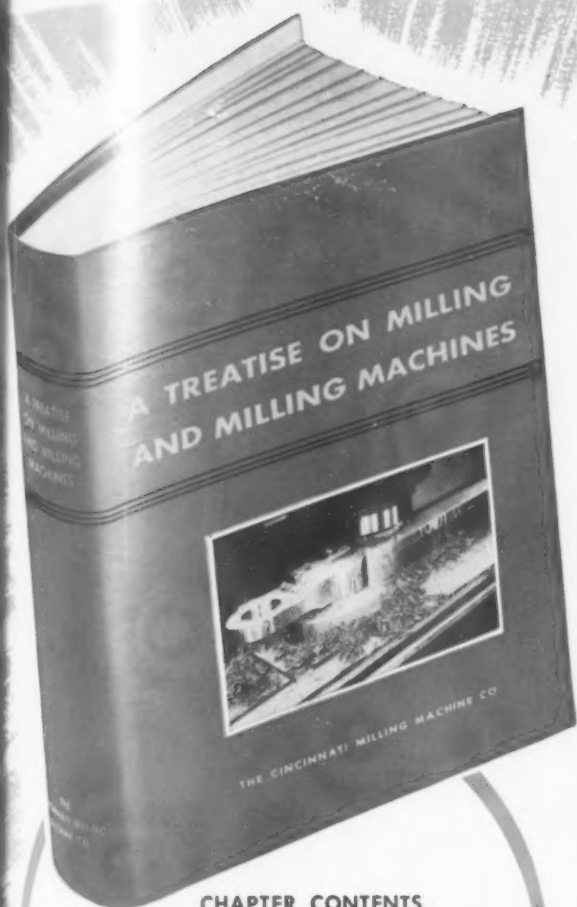
Without obligation, send us samples of your riveting, staking or wire stripping work. They will be processed and returned along with our complete recommendations, guaranteed production data and proposal on the most efficient equipment for handling your work.

Literature available on any or all of the above High Speed machines. Write us today.

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CHAPTER CONTENTS

- CHAPTER 1 The Milling Machine
- CHAPTER 2 Milling Machine Accessories
- CHAPTER 3 Milling Cutters
- CHAPTER 4 Milling Cutter Materials
- CHAPTER 5 Milling Cutter Elements
- CHAPTER 6 Sharpening and Care of Milling Cutters
- CHAPTER 7 The Milling Process
- CHAPTER 8 Chip Formation, Surface Finish, and Cutting Fluids
- CHAPTER 9 Power Required in Milling
- CHAPTER 10 Mounting of Milling Cutters
- CHAPTER 11 The Milling Machine in Toolroom Work
- CHAPTER 12 The Use of Work Indexing in Repetitive Milling Operations
- CHAPTER 13 Milling of Helical Surfaces
- CHAPTER 14 Milling Cams and Other Surfaces of Curved Contour
- CHAPTER 15 Milling Dies, Molds, and Parts of Cylindrical or Irregular Contour
- CHAPTER 16 Diversified Uses of Milling Equipment in Toolroom Work and Inspection
- CHAPTER 17 Production Milling
- CHAPTER 18 Fixtures and Fixture Design
- CHAPTER 19 Estimating Production Milling



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Methods and tool engineers who are interested in milling machines and their low-cost production possibilities should have a copy of this new book, "A Treatise on Milling and Milling Machines." It covers every phase of milling from the basic types of machines to the economics of machine replacement.

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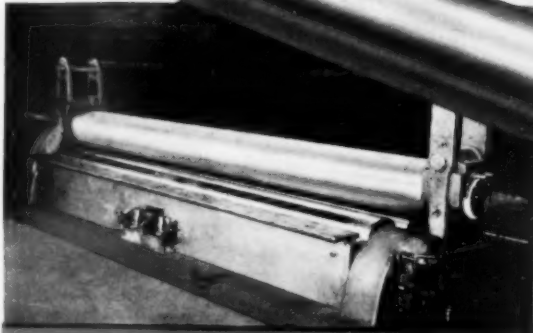
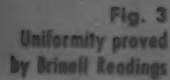


Fig. 2
Plate Bending Machine



SPECIFY **MEEHANITE CASTINGS**

The Tool Engineer

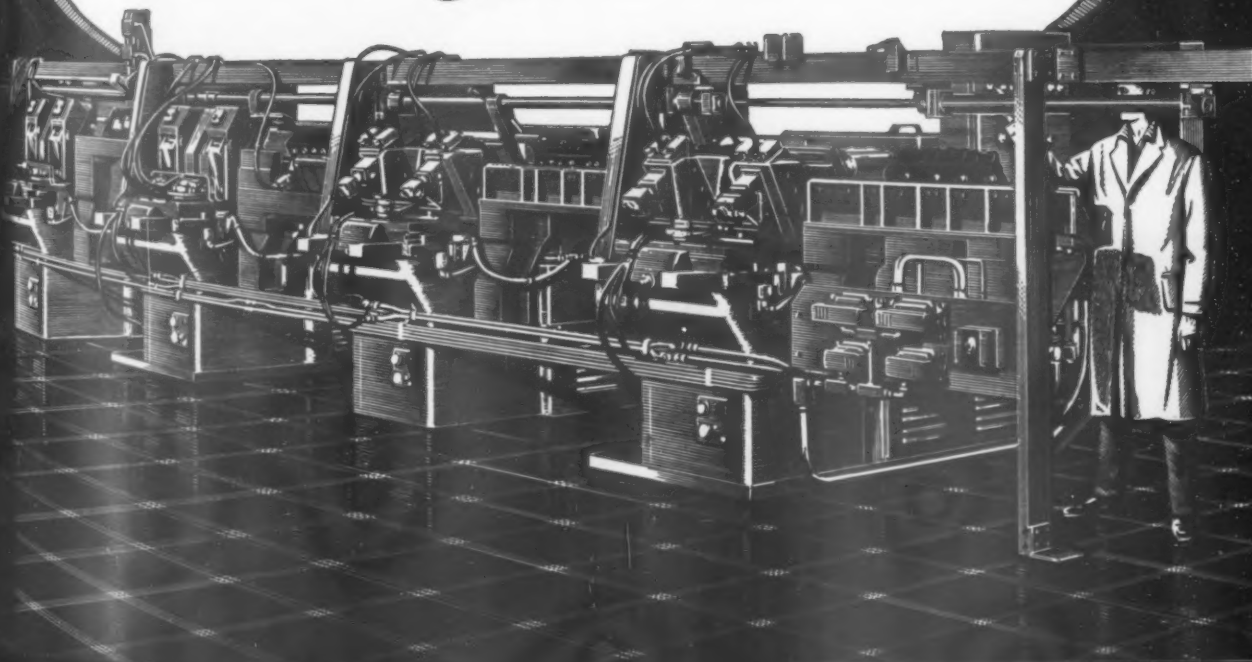


*What names come to your mind
when you think of
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MOST of the ones you think of first have bought New Britain Automatics within the past few years for new and better ways of doing important metalworking jobs. The New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Conn.

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HIGH ACCURACY CAPACITY PRODUCTION

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9-POWER FEEDS

- Dual Speed
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- Circulating oil pump

SPECIFICATIONS

12 Spindle Speeds

Ratio 1 to 1.41

Range 26 to 850 or 38 to 1200

9 Power Feeds in inches per RPM of Spindle
or spindle head—.0047 to .079
or—.0016 to .027

Spindle and spindle head together—
.0094 to .158
or—.0032 to .053

Drilling Depth—14" or with
Spindle and Spindle head—28"

Overall Height—11.6'

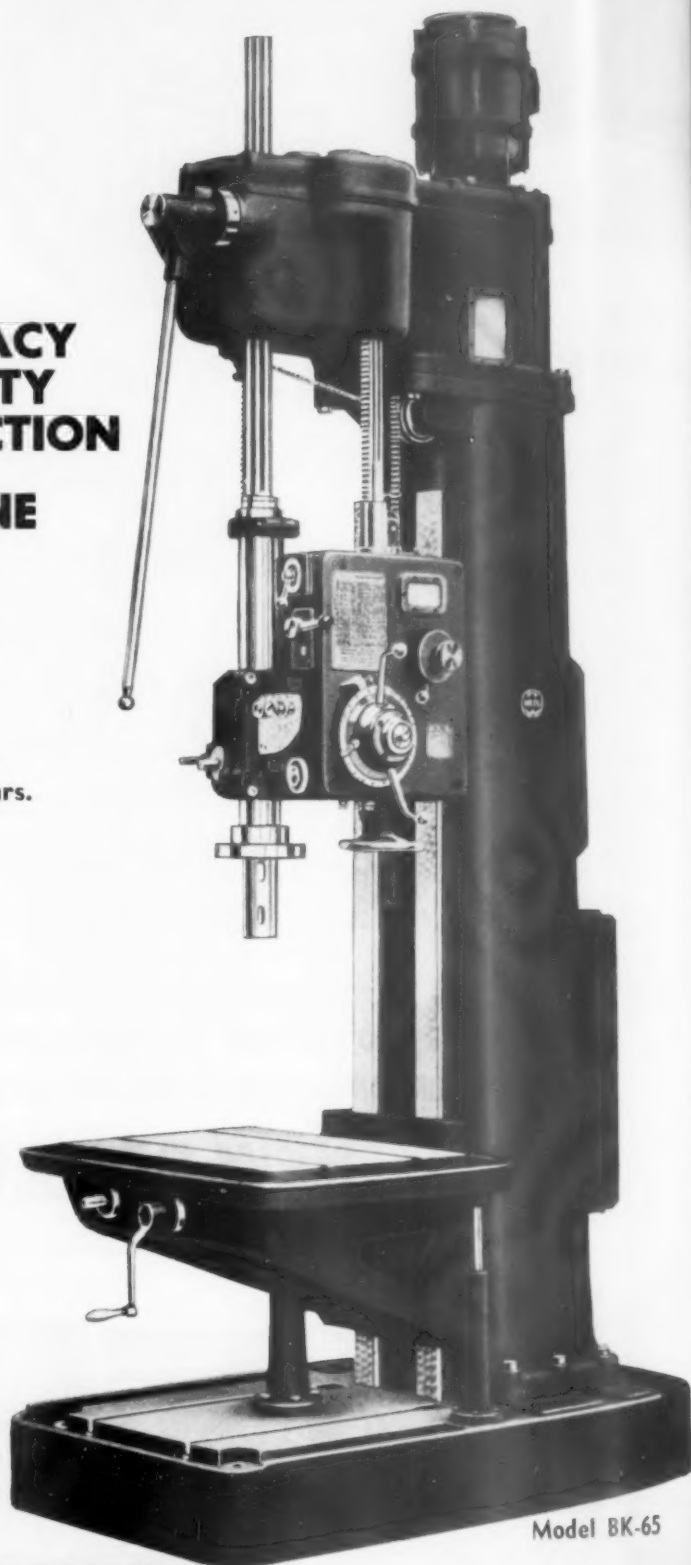
Weight approximately 7000 lbs.

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Booths 1901-2-2000

Tool Steel Topics



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributors: Bethlehem Steel Export Corporation

Users Pick A-H5 in Survey of Air-Hardening Steels

Several years ago we had to make up our minds whether we were going to promote the 2 pct chromium steel or the 5 pct chromium type. Both are general-purpose die steels. In other words, plenty of wear-resistance is a must — plus sufficient shock-resistance for cold work.

The big question was to decide which was more important — the lower annealed stresses and easier machining of A-H5 (the 5 pct chromium steel) or the lower quenching temperature of the 2 pct chromium type.

We made an investigation among makers of tool steel, heat-treaters, and users. And here's what we found they rated most, in order of importance:

1. Maximum wear
2. Minimum distortion in heat-treatment
3. Easy machining
4. Adequate shock-resistance
5. Low quenching temperature

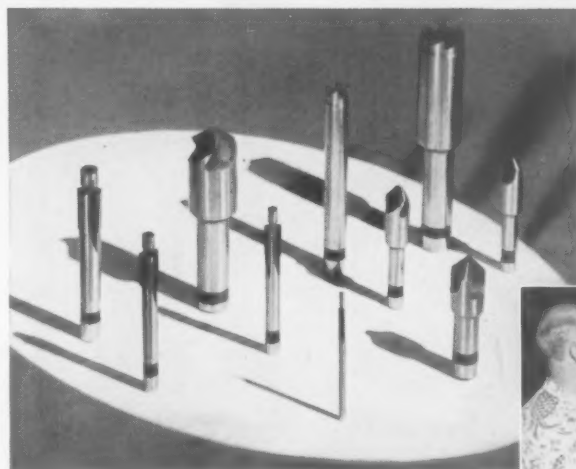
It was a clear-cut vote for A-H5. And when the question of shock-resistance was raised, they agreed, "If it's a shock, then use a regular shock tool steel like Bethlehem Omega or 67 Chisel."

Our decision to carry rather complete stocks of A-H5 has been fully justified by owing to the 5 pct chrome grade. We've watched A-H5 reach a new high in popularity for jobs that call for safe grinding, very little distortion, and high wear-resistance.

Users say:
"... Never had such fine service from..."

"Don't know what it is to have cracked dies any more."

"... I've cut my costs on grinding and saving many times since using A-H5."



These precision cutting tools are made from Bethlehem 66HS, our molybdenum high-speed steel. The CTC trademark appears in the under-cut bands on the shank of each tool.

Final dimensions are checked on a main rotor balance stand for use by several helicopter manufacturers. Built by Custom Tool, this special fixture has a tip made of Bethlehem 67 Chisel tool steel.



Custom Tools made from Standard Tool Steels

It takes a variety of Bethlehem tool steels to meet the needs of Custom Tool Co., North Hollywood, Calif. Makers of special tools, especially those required in aircraft repair and assembly, this firm is the outgrowth of a home workshop where Ben Sprague, president of the company, began to make his own special tools to make the overhauling of aircraft an easier job.

Today the CTC trademark appears in the black band on the shank of countersinks, counterbores, hollow mills, special wrenches, fixtures and jigs. Quality steel and careful heat-treatment go hand in hand with the precision machining of tools made to close tolerances.

Here's a fine example of how many tool and die jobs are handled by standard tool steels. The CTC cutting tools are ordinarily made from Bethlehem Special HS, our standard 18-4-1 type of high-speed steel. But tungsten conservation measures now require the use of our molybdenum steel, Bethlehem 66HS.

Tools subject to heavy shock or impact loads are made either from Omega, our silico-manganese tool steel, or 67 Chisel, the chrome-tungsten type.

BTR, our manganese oil-hardening tool steel, was used recently by Custom Tool in a new series of screw gages which have been designed to set up standards for aircraft fasteners.



Our Tool Steel Engineer Says: Use extra care in quenching large sections of carbon tool steel

Large tools made of carbon tool steel can be cracked very easily during quenching. A quench which only partially hardens a tool made of carbon tool steel is more likely to cause cracking than a quench which produces full hardening.

A quench which produces soft spots in the chill of carbon tool steel can cause cracking which is violent enough to be classed as an explosion — the tool may literally break up into a number of pieces.

Ineffective quenching which causes soft spots may result from:

Use of fresh water containing dissolved air... use of water contaminated by soap, oil, etc... insufficient quantity of quenching solution... inadequate agitation in the quench.

A drastic quench in brine which produces a uniform chill is necessary to avoid cracking large tools when they're made from carbon tool steel.

Bethlehem



Tool Steel

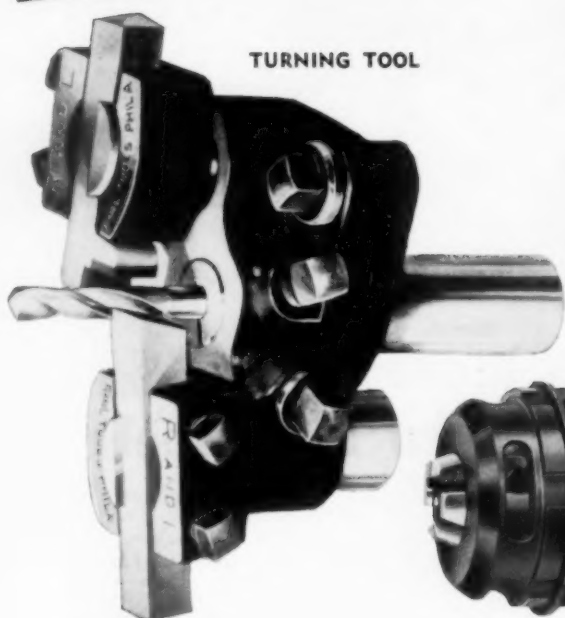


Very sharp on the trimmer die of A-H5 which was ragged metal from sheet-steel parts.

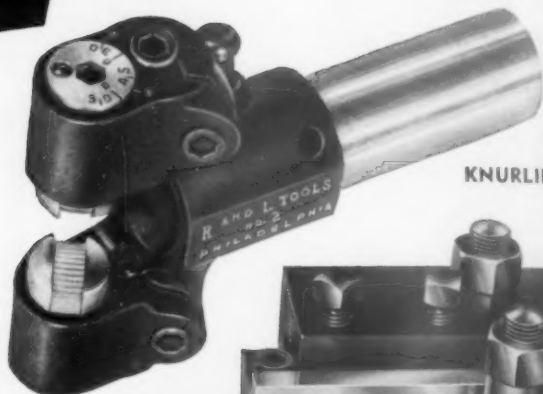


MANUFACTURERS OF PRECISION SCREW MACHINE TOOLS

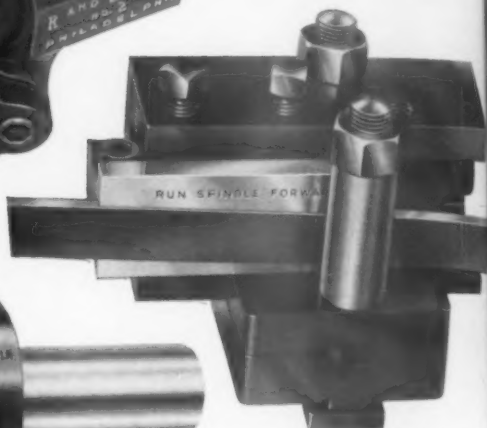
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TURNING TOOL



KNURLING TOOL



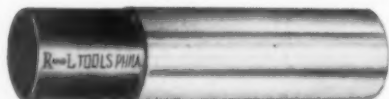
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FLOATING DRILL HOLDER



REVOLVING STOCK STOP



RELEASING TAP
AND DIE HOLDER



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R AND L TOOLS

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The Tool Engineer

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Obtain the advantages of automatic operations in your Press Room by using U. S. Slide Feeds, Straighteners, Stock Reels, Coil Cradles, Scrap Choppers, etc. These units are designed and built to provide increased efficiency, greater production and material savings, and reduced labor costs.

The photograph above—courtesy of Whirl-

pool Corporation, St. Joseph, Mich., prominent manufacturers of Home Laundry Equipment for over 50 years—illustrates a set-up of U. S. Automatic Press Room Equipment at their plant.

The U. S. Slide Feeds are recognized as the most accurate automatic Feeds on the market. They can pull material, within their capacity, through a Plain Stock Straightener and still maintain controlled accuracy. Bulletin No. 80-E contains complete specifications. Ask for your copy.



U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides—U. S. Multi-Millers

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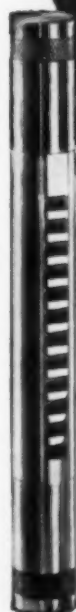
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SPECIFY GLENNY . . . greater strength . . . maximum accuracy . . . fully adjustable for depth . . . interchangeable high-speed blades . . . bushing adapters available . . . will cut tapered keyways . . . hardened tool-steel external parts . . .

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181 KM

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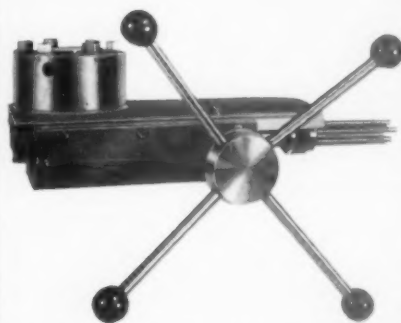
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BED TURRET automatic indexing



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ASTE
Show
Booth
543

• Here is an attachment that is truly the finest engineered tool of its kind ever offered.

- Tool holder positions are not bored and are to be bored on the lathe on which Bed Turret is to be used to assure accurate alignment.
- Tool holder positions may be bored to 5/8 or 3/4 inch. 1 inch optional at extra cost.
- Turret head is automatic indexing and may be free-wheeled.
- Indexing parts are hardened where necessary for accuracy and long life.
- Ram and base are dove-tailed on both sides and lapped. Gib is adjustable.
- Tool diameter 3 1/2 in. (9 in. lathes 2 1/2 in.)
- Tool length from turret 6 1/2 inch.
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- Overall travel ram 5 3/8 inch.

Write for descriptive literature
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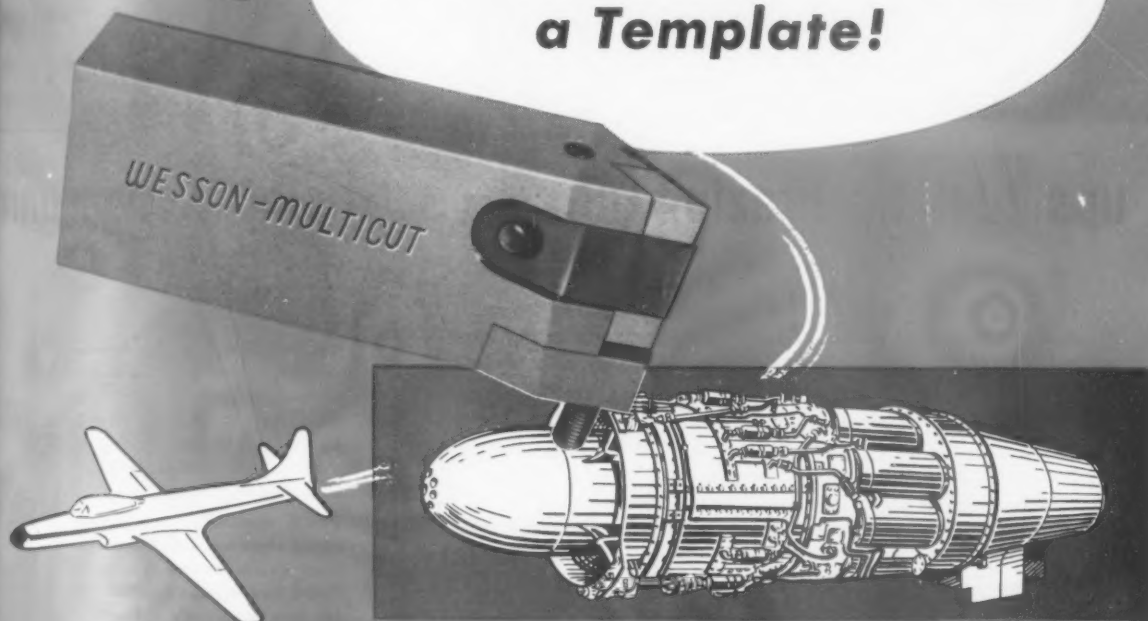
The Tool Engineer

Developed for Jet Engine Production on

"FOLLOWER" LATHES

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...and Makes Jet Engine Production Jump!

Jet engine shrouds and discs are being machined 4 to 6 times faster—on follower or tracer equipped lathes. With Wesson's #10 Multicut tool holder and a Wesson-metal 55° solid carbide insert, a maximum cutting edge clearance of 35° on both sides

is possible for straight shoulder turning. The two cutting edges will permit a cut from right to left or left to right. Insert provides a total of four cutting edges when turned end for end. Write today for details.

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ups tool tip brazing 135% . . . replaces two units

Production brazing of carbide tip tools has soared from 270 to more than 600 an hour since Wendt-Sonis, Hannibal, Mo., tool manufacturer, installed a Lindberg induction heating unit.

Two operators, fluxing parts and putting brazing metal and carbide tool tips in place, load the assemblies on a conveyor belt that passes a continuous stream of work through a specially designed, long hair-pin type heating coil.

Production is speeded because 14 tool assemblies . . . not just one . . . are in the heating field at any given time. The first tool on the conveyor passes from the heating area, leaving 13 others still in the field of heat, with tool number 15 just entering the coil area.

Production, formerly through two smaller units, totalled only 135 tools per hour, per unit, and required four operators. Thus the new equipment frees two operators for other important work.

If your requirements call for production brazing, soldering, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, a Lindberg induction heating unit can better your production picture . . . minimize costs . . . increase profits.

Bulletin 1440 gives additional details. We'll be glad to send you a copy.

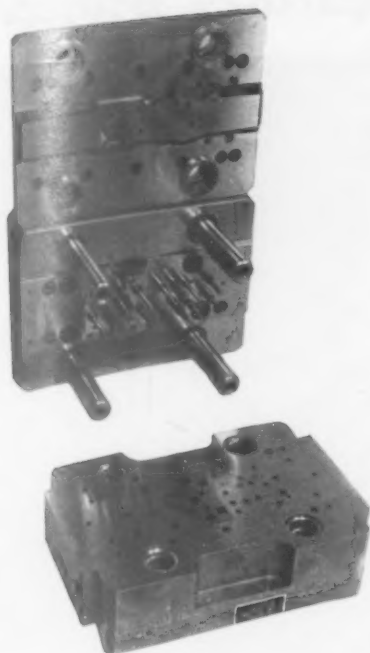
Booth 1333 . . . at the American Society of Tool Engineers Exposition, March 17-21 in Chicago, is the Lindberg booth. You'll see, in operation, an induction heating unit, brazing tool bits.

You'll see tiny model furnaces showing recommended tool room arrangements. You'll see demonstrations of air and hydraulic cylinders.

TOUR No. 7 . . . Be sure to sign up for a tour through the huge Lindberg Steel Treating Co. plant . . . starting from the Conrad Hilton (Stevens) Hotel at 9:00 A.M. Monday, Tuesday, Thursday and Friday.

LINDBERG HIGH FREQUENCY DIVISION

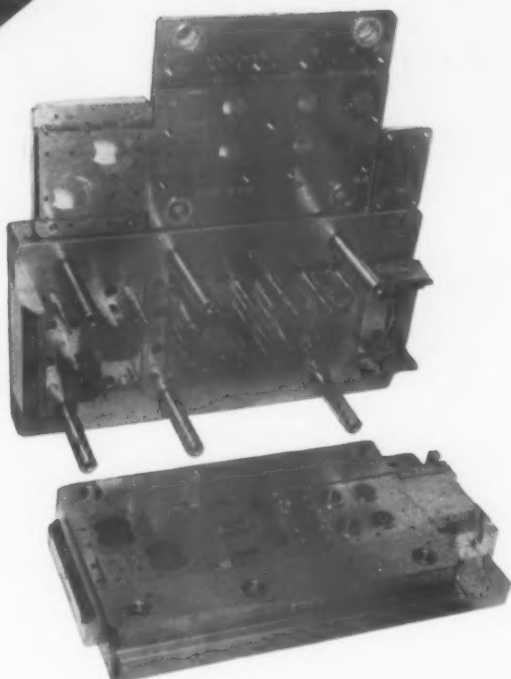
Lindberg Engineering Company, 2450 West Hubbard Street, Chicago 12, Illinois



← This progressive Carbide Die pierces, shaves and blanks 1/16" thick steel. Precision built throughout. It features a custom-built Four Post Die Set, Solid Carbide Punches and Cutting Edges, and a spring-type Fully Guided Stripper that provides positive support to the punches during the piercing and blanking operations. Two of the holes pierced are .066" diameter.

Want to make a Million?

→ A typical Carbide Rotor and Stator Lamination Die. All Punches and Cutting Edges are solid carbide. Each press stroke produces two rotors and two stators. Average strokes per grind 750,000— or 1,500,000 pairs of laminations per sharpening. The material blanked is 20 gauge Silicon Steel.

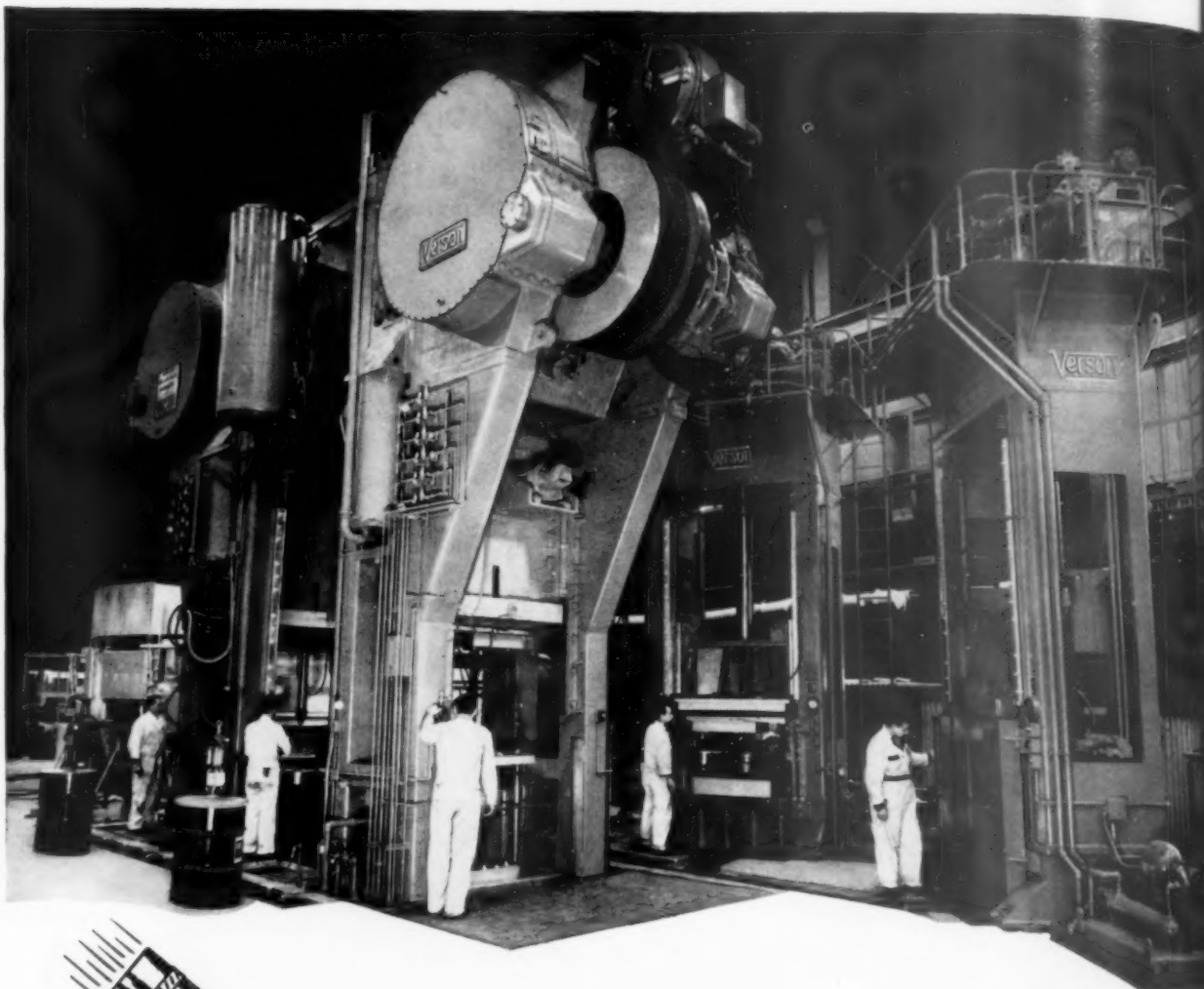


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When the photograph reproduced above was made, the tool-up was in the process of being set up. Completed, the tool-up incorporates con-

veyors for automatic handling between operations and automatic handling in the press.

This tool-up illustrates how Verson engineering can speed production and cut the cost of vitally needed defense materials. We will be pleased to send you additional information on this projectile tool-up or to discuss your needs with you. Write or phone.

See a pictorial display of this projectile tool-up at the Verson booth at the Tool Show in Chicago, March 17-21. Samples of the forgings will be available for your examination.

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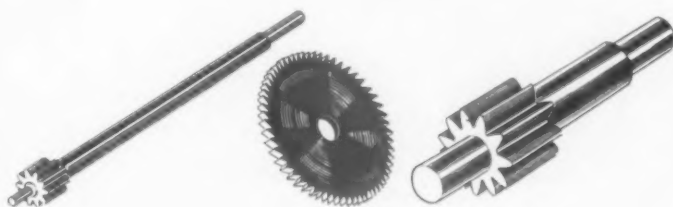
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ALLEN SCREW ... SOCKET SCREW

mean the same thing everywhere!

Although *Allen O Screw* is not in the dictionary, engineers and production men the world over say

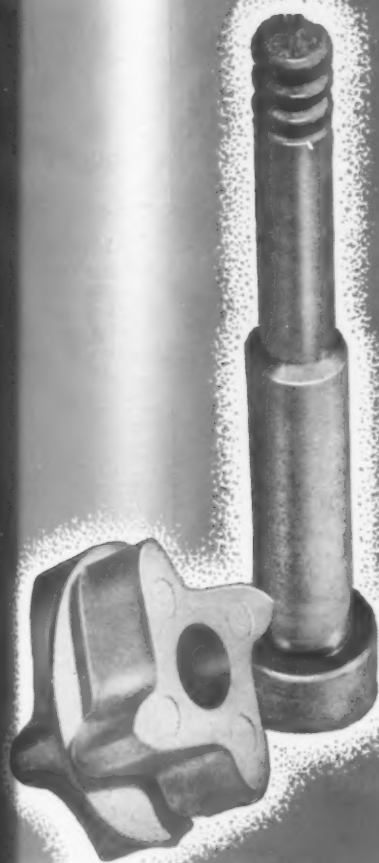
Allen O Screws to refer to *precision socket screws*.

That's how it is with names — probably there's a name that comes to your mind at once as an outstanding *Industrial Distributor* in your locality.

He is almost certain to be the one who handles *Allen O Screw* products. His experience and extensive stock of Allen O products are the ideal combination to smooth out any problems you encounter in precision fastenings.

THE **BUY** WORD IN SOCKET SCREWS IS **ALLEN**





Life of This Tool Increased **17** TIMES After Treatment with **HARD'N'TUFF**

The die cast zinc rotor shown (left) is subjected to a burnishing operation which removes .02 inches of stock. The tool used (right) normally produced from high speed and hard chrome steels was able to finish only 20,000 to 30,000 pieces before refinishing.

Because of alloy steel shortages and in an attempt to bring about an efficient increase in production the tool was cut from cold rolled steel and treated with HARD'N'TUFF. The user says: "It finally wore out after 500,000 pieces. It held its size all the time it was in use. Previous tools of high speed and hard chrome plate steel lasted approximately 20,000 or 30,000 pieces. What better recommendation could I give your material?"

Here is real proof that HARD'N'TUFF, the steel hardening compound that provides fast effective three-way action;—carburizing, nitriding, chromizing—can solve many part hardening problems.

The metallurgical effect of the action of HARD'N'TUFF provides structural and chemical changes which raise the Quality properties of the low carbon mild steels.

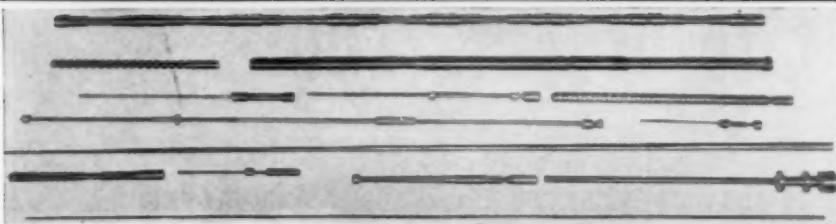
Easy to use—heat the part, dip and roll in the compound; HARD'N'TUFF is non-toxic and can be used on all types of tools, drills, dies, cams, bits—wherever maximum toughness and wear resistance are required. Write for our folder "How to Use HARD'N'TUFF."

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TOOL LIFE INCREASED 300%
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straight or tapered parts to unlimited lengths and
diameters, with **KARGE TURNOMAT Turning Machine**



PARTS like THESE... on your present equipment!

By an ingenious method of using the bar stock material as a driving or connecting link between lathe or screw-machine spindle, and the TURNOMAT rotating spindle, production of parts similar to those shown above is made possible.

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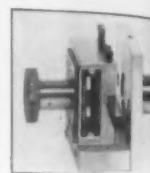
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ATLAS
PRESS
BOOTH 1510

TURNOMAT Turning Machine. 2 or 3 tool position. Mounts on lathe cross slide in place of compound rest. Fits any lathe.



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FOR
MACHINE TOOLS

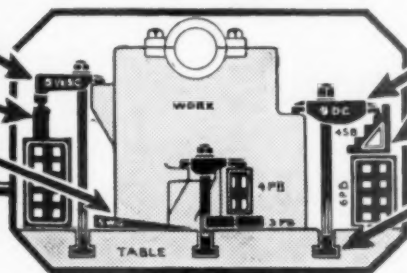
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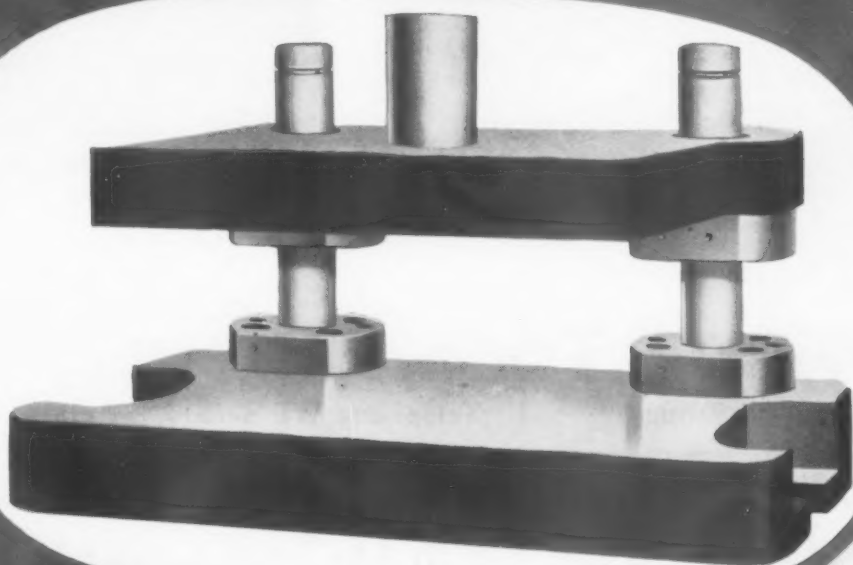
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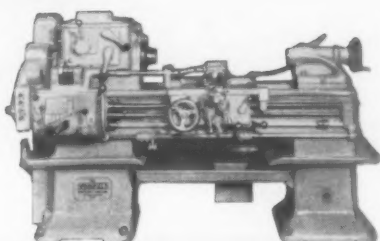
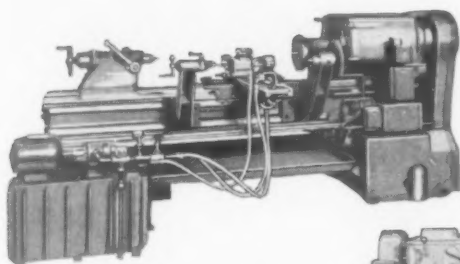
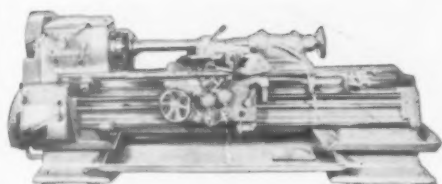
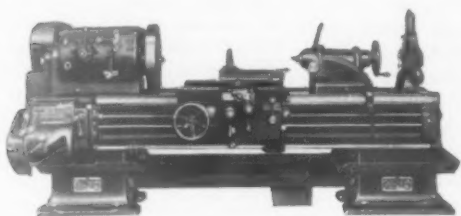
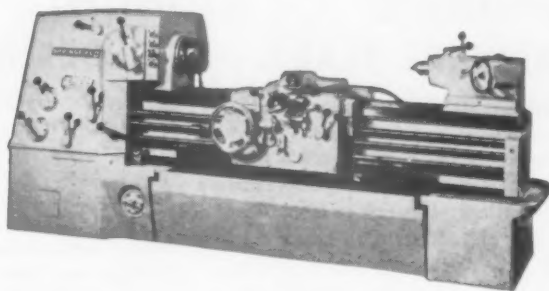
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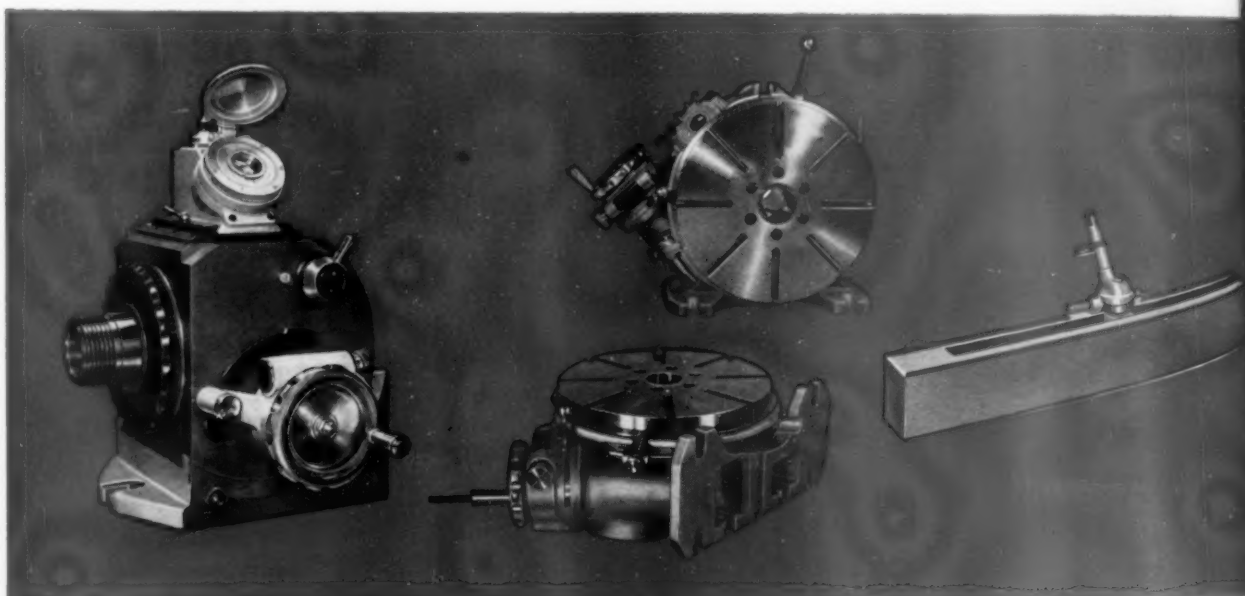
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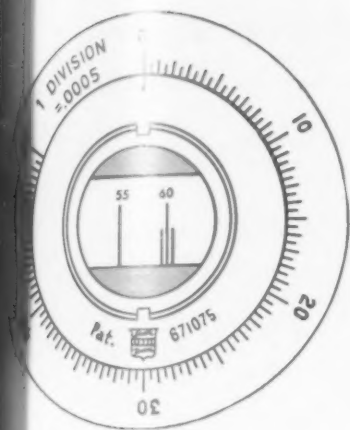
formation on optical tooling for production and optical instrumentation for inspection ask for this literature.

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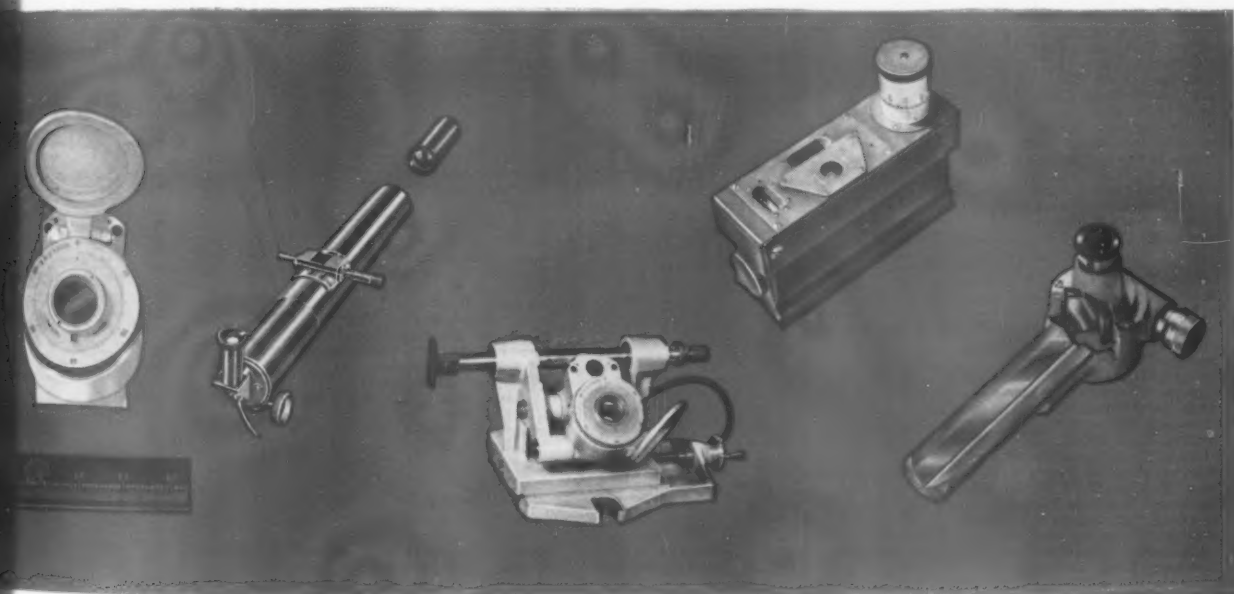
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Index of The Tool Engineer Advertisers

March, 1952

The Index to Advertisers is published as a reader service. Although every precaution is taken to assure correct listing, no allowance will be made for error or omission.

*Exhibitor in 1952 ASTE Industrial Exposition

A	
*Accurate Bushing Co.	197
*Ace Drill Bushing Co.	282
*Acme-Danneman Co., Inc.	334
†Acme Industrial Co.	307
*Acme Tool Co.	276
*Adamas Carbide Corp.	324
*Allegheny Ludlum Steel Corp.	322
*Allen Mfg. Co., The	396
*Allison Co., The	179
Alloy Rods Co.	332
American Broach & Machine Co., Division of Sunstrand Machine Tool Co.	312
*†American Chain and Cable Co., Wilson Mechanical Instrument Co.	307
American Drill Bushing Co.	369
*American Pullmax Co., The	308
*American SIP Corp.	257
*American Society of Tool Engineers	000
*American Wheelabrator & Equipment Corp.	154
Ames Precision Machine Works	304
*Anderson, F. E., Oil Co.	32
*Annis, R. B., Company	300
Anton Machine Works	203
A-P Controls Corp.	210
Apex Tool & Cutter Co., The	308
*Armstrong Brothers Tool Co.	150
*Arrow Tool & Reamer Co.	317
*Atlas Press Co., Clousing Division	251
*Atrax Co., Division of Charles L. Jarvis Co.	341
*Automatic Steel Products, Inc., The Cleveland Tapping Machine Co., Subsidiary	246-247
B	
Baker Brothers, Inc.	326
Balas Collet Mfg. Co.	406
*Barnes Drill Company	137
Bath, John, Co., Inc.	361
*Baumbach, E. A., Mfg. Co.	209-399
Bausch Machine Tool Co.	293
*Bay State Abrasive Products	315
Bay State Tap & Die Co.	328
Behr-Manning Corp.	254-255
*Bellows Company, The	353
Besly-Wells Corp.	309
Bethlehem Steel Co.	387
*Bijur Lubricating Corp.	204
*Black Drill Co.	276
*†Boyar Schultz Corp.	8
*Brinnell Company, The	344
*Brown & Sharpe Mfg. Co.	175-176-177-178
*Bristol Co., The	307
*British Industries Corp.	233
Bryant Machinery and Engineering Co.	226-401
Bunting Brass & Bronze Co.	346
Butterfield Division, Union Twist Drill Co.	331
C	
*Cadillac Stamp Co.	311
Capitol Machinery Corp.	300
Carborundum Co., The	10-11
Card, S. W., Co., Division of Union Twist Drill Co.	305
*Carpenter Steel Co.	337
*Chicago Dial Indicator Co.	164
*Chicago Mfg. & Distributing Co.	311
*Chicago Wheel & Mfg. Co.	138
Cincinnati Milling Machine Co.	383
Cincinnati Shaper Co., The	16-28-29
*Circular Tool Co.	199
*Clousing Division, Atlas Press Co.	251
*Clearing Machine Corp.	349
*Cleco Division, Reed Roller Bit Co.	243
Cleeman Machine Tool Co.	226
Cleveland Industrial Tool Co.	250
*Cleveland Tapping Machine Co., The Automatic Steel Products Inc., Subsidiary	246-247
Cleveland Twist Drill Co.	291
*Columbia Enterprises, Inc.	342
Columbia Tool Steel Co.	140
*Commander Mfg. Co.	230
Cone Automatic Machine Co.	242
*Cone-Drive Gears Division, Michigan Tool Co.	371
*Cosa Corp.	248-249
*Crucible Steel Co. of America	253
Curta Calculator Co.	143
Cushman Chuck Co., The	381
D	
*Danly Machine Specialties, Inc.	351
Danneman Die Set Division, Acme-Danneman Co., Inc.	334
*Davis Boring Tool Division, Giddings & Lewis Machine Tool Co., Inc.	314
*Dazor Mfg. Co.	378
*Delta Power Tool Division, Rockwell Mfg. Co.	313
Denison Engineering Co., The	250-278
*Detrex Corp.	170
Detroit Reamer & Tool Co.	374
*Detroit Stamping Co.	155
Detterbeck, Lester G.	300
Dickerman, H. E., Mfg. Co.	202
Die Techniques Publication	153
*Dilley Manufacturing Co., The	153

†User of ASTE Data Sheets

E	
*Do-All Co., The	11-12
*Doerr Electric Corp.	
*Doughty Laboratories, Inc.	
*Drive-All Mfg. Co.	
*Dumore Co., The	
Dykem Co., The	
F	
Eagle Mfg. Co.	
*Eastern Machine Screw Corp.	
*Eastern Tool Co., The	
*Eastman Kodak Co., Industrial Optical Sales Division	
*†Eclipse Counterbore Co.	
Electrons, Inc.	
Emhart Mfg. Co., Henry & Wright Division	
*Enco Mfg. Co.	
*Engineering Mfg. Co.	
Engineering Service Co.	
*Engineers Specialties Division	
*Engis Equipment Co.	144
*Ercona Corp.	
*Erickson Tools Division	
*Etteco Tool Co.	
*Ex-Cell-O Corp.	Inside Back Co.
G	
*Gairing Tool Co., The	
*Galland-Henning Mfg. Co.	
*Gammons-Hoaglund Co.	
Garrison Machine Works	
*Garvin Brothers, Inc.	
Gay-Lee Co.	
Geometric Tool Co., Division of Greenfield Tap & Die Corp.	154
*Giddings & Lewis Machine Tool Co., Davis Boring Tool Division	132
Gisholt Machine Co.	
Gorham Tool Co.	
*Govro-Nelson Co.	
*Graham Machine Tool Co.	
Graham Mintel Instrument Co.	
Greenfield Tap & Die Corp.	154
Greenlee Bros. & Co.	
*Griswold, F. T., Mfg. Co.	480
*Grobet File Company of America	
*Guthery Machine Tool Corp.	
H	
*Hanchett Magna-Lock Corp.	
*Handy & Harmon	
Hanna Engineering Works	
Hannifin Corp.	
Hardinge Brothers, Inc.	
Hassall, John, Inc.	
Heald Machine Co., The	Inside Front Co.
*H. E. B. Machine Tools, Inc.	
*Henry & Wright, Division of Emhart Mfg. Co.	
High Speed Hammer Co.	
*Hofmann, Alfred, & Co.	
*Honan-Crane Corp., Subsidiary of Houdaille-Hershey Corp.	
Howe & Fant, Inc.	
*Hydroway Scales, Inc.	
Hy-Pro Tool Co.	
I	
*Ingersoll-Rand Co.	
J	
*Jarvis, Charles L., Co., Atrax Co. Division	
*Jergens, J. G., Co.	
Jessop Steel Co.	
*Johansson, C. E., Gage Co., Division of Swedish Gage Co. of America	
†Jones & Lamson Machine Co.	
K	
Kase Machine Co.	
*Kaufman Mfg. Co.	
*Kearny Trecker Corp., Walker-Turner Division	
Keller Tool Co.	
*Kelvin Systems Corp.	
Kempamith Machine Co.	
*Kennametal, Inc.	
Kingsbury Machine Tool Corp.	
Kling Brothers Engineering Works	
*Klingelhoefer Machine Tool Co.	
Knight, W. B., Machinery Co.	
Koebel Diamond Tool Co.	
*Korfund Company, Inc., The	
L	
Lamb Co., F. J.	
*Landis Machine Co.	
Lapointe Machine Co., The	

Long Tool Co.	324
Long Electric Steel	36
Long & Ide, Inc.	159
Longstrom Mfg. Co.	163
Longbraden Co., The	261
Long Electric Co.	256
Long Engineering	392
Long-Railway Corp.	184
Long F. J. Machine Co.	276
Longhard Aircraft Corp.	272
Long Inc.	168
Long Engineering Co.	297
Long Machine Division	283
New Britain Machine Co.	

M

Mach Products	328
M. I. Export and Import, Ltd.	240-241
Manhattan Rubber Division, Raybestos-Manhattan, Inc.	350
Man Machinery Corp.	149
Man Mfg. Co.	172
Manthous, James H. & Co.	304
Man-Crowley Tool Co.	27
Man-Metal Corp.	384
Man Engineering, Inc.	368
Man Carbides Corp.	364
Man Tool Co.	371
Man Hone Corp.	319
Manometrical Mfg. Co.	148
Man Rivet & Machine Co.	354
Man Motor Co.	336
Man, A. & Co.	183-207
Man Industrial Engineering Co.	238
Man Tool Company, The	298
Man Special Tool Co.	188
Man Machinery Co., Inc.	213-214-215-216-217-218
Man Machine Works	335
Man Twist Drill & Machine Co.	22-23
Man & Merryweather Co.	359

N

National Automatic Tool Co.	220-221
National Branch & Machine Co.	355
National Machine Tool Co.	300
National Tool Co.	357
National Tool Salvage Co., The	310
National Twist Drill & Tool Co.	6-7
Nation Tool Company, The	135
New Britain-Gridley Machine Division,	
New Britain Machine Co.	385
Newman Products, Inc.	193
New Hermes, Inc.	373
Niagara Machine & Tool Works	9
Niles-Bement-Pond Co., Pratt and Whitney Division	231
Nilson Gage Company	370
Norton Co., The	262-263

O

Ohite Products, Inc.	296
Ohl Mfg. Co.	393
Ohio Crankshaft Co., The Tocco Division	329
O. K. Tool Co., Inc., The	288-289
O'Neil-Irwin Mfg. Co.	143
Olsen, Kurt, Co., Inc.	266-267
Oland Gear & Machine Co.	194
Oltman-Miller Machine Co.	367
Olmüller, W. H. Co.	310

P

Parker-Kalon Corp.	228-229
Parker-Majestic, Inc.	270
Parkwood Laminates, Inc.	247
Parnish Steel Products	159
Pioneer Engineering & Mfg. Co.	139
Pioneer Pump & Mfg. Co.	139
Pioneer Tool & Engineering Co.	149
Pioneer Tool Engineering, Inc.	296
Pan-O-Mill Corp.	363
Pape Machinery Corp.	223
Pear & Whitney Division, Niles-Bement-Pond Co.	231
Pecis Products Co.	282
Precision Diamond Tool Co.	290
Precut Safety Chuck Co.	142
Protective Coatings, Inc.	348

R

R. and L. Tools, Inc.	388
Rahn Granite Surface Plate Co.	296
Raybestos-Manhattan, Inc., Manhattan Rubber Division	350
Ready Tool Co.	311
Reed Rolled Thread Die Co.	165
Reed Roller Bit Co., Cleco Division	243
Rehnberg-Jacobson Mfg. Co.	325
Republic Gage Co.	134
Rivett Lathe and Grinder, Inc.	333
Robertson Mfg. Co.	260
Rockwell Mfg. Co., Delta Power Division	313
Roto-Finish Co.	190
Royal Oak Tool & Machine Co.	169
Royal Products, Inc.	348
Russell, Holbrook & Henderson, Inc.	395
Rushman Machinery Co.	296
Ryerson, Joseph T. & Son, Inc.	132

S

S & E Machine Products, Inc.	186
S. & S Machinery Co.	244-245
Scherr, George, Co., Inc.	230-299
Schrader's, A., Son, Division of Scovill Mfg. Co., Inc.	239
Scully-Jones Co.	237
Seneca Falls Machine Co.	294-295
Sentry Co., The	201
Service Machine Co.	160
Severance Tool Industries, Inc.	200
Sheffer Collet Co.	205
Sheffield Corp., The	352
Sheldon Machine Co.	173
Sidney Machine Tool Co.	268
Simonds Abrasive Co.	156
Simonds Saw & Steel Co.	26
Skinner Chuck Co.	189
Smit, J. K. & Sons, Inc.	298
Snow Manufacturing Co.	211
Snyder Tool & Engineering Co.	280-281
Special Engineering Service	340
Springfield Machine Tool Co.	401
Stadoll Mfg. Co.	400
Standard Electrical Tool Co.	171
Standard Gage Co., Inc.	5
Standard Pressed Steel Corp.	224-225
Standard Shop Equipment Co.	398
Standard Tool Co.	327
Staples Tool Co., The	324
Starrett, L. S., Co., The	13
Stokerunit Corp.	258
Stokvis, Edera & Co., Inc.	366
Strong, Carlisle & Hammond Co.	317
Stuart, D. A., Oil Co., Ltd.	212
Sturdy Broaching Service	298
Sturtevant, P. A., Co.	328
Sundstrand Machine Tool Co.	30-31
Sundstrand Machine Tool Co.,	
American Broach & Machine Co. Division	312
Sun Oil Co.	14-15
Super Tool Co.	323
Superdual Corp.	250
Swartz Tool Products, Inc.	400
Swedish Gage Co. of America, C. E. Johansson Gage Co. Division	356

T

Taft-Peirce Mfg. Co.	284-285
Thompson, Henry G., & Son, Co.	152
Threadwell Tap & Die Co.	235-236
Tocco Division, Ohio Crankshaft Co.	329
Toritt Mfg. Co.	317
Turnomat Co., Inc.	398

U

Union Twist Drill Co.	219
S. W. Card Division	305
Butterfield Division	331
U. S. Tool Co., Inc.	389
Universal Engineering Co.	343

V

V & O Press Co., The	345
Valley Machinery & Supply Co.	273
Vanadium-Alloys Steel Co.	302-303
Vapor Blast Mfg. Co.	274
Verson Allsteel Press Co.	394
Vickers, Inc.	347
Victor Machinery Exchange	298
Viking Industries	334
Viking Tool Co., The	161

W

Wahlund, M. Paul, Mechanical Laboratory	390
Wales-Strippit Corp.	Back Cover
Walker, O. S. Co., Inc.	167
Walker-Turner Division, Kearney Trecker Corp.	252
Ward Leonard Electric Co.	234
Warner & Swasey Co., The	306
Waukesha Tool Co.	373
Wendt-Sonis Co.	198
Wesson Co.	391
Westinghouse Air Brake Co.	377
West Point Mfg. Co.	180
Wheel Truing Tool Co.	320-321
Wiedemann Machine Co.	360
Wilson Mechanical Instrument Co.,	
American Chain & Cable Co., Inc.	307
Wilton Tool Mfg. Co.	147
Winter Brothers Co., Division of National Twist Drill & Tool Co.	6-7
Wolverine Tool Co.	290
Woodworth, N. A., Co.	318

Y

Yoder Co., The	339
----------------	-----

Z

Zagar Tool Co.	192
Ziegler, W. M., Tool Co.	298

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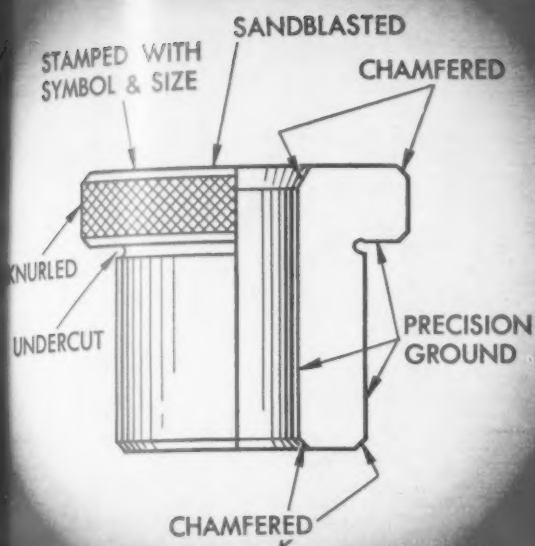
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